

COVID-19: Questionable Seasonality

Sir,

COVID-19 pandemic has become the worst pandemic in the last 100 years and it is still spreading. It is of our particular interest to comprehend whether COVID-19 is seasonal to guide us better plan our interventions accordingly. Variation in seasonality is one of the key factors that play a role in viral transmission. The absence of herd immunity to COVID-19 suggests that it is weather resistant and is spreading in the population with no prior immunity.¹

Temperature and humidity is inversely correlated with global SARS-CoV-2 transmission.¹⁻³ COVID-19 appears to be temperature-sensitive which makes it seasonal. With the wealth of information from epidemiological studies,³⁻⁵ it is plausible to think that COVID-19 could exhibit seasonal features. With mounting evidence, COVID-19 has the potential to become a seasonal illness like influenza and it is important to study if temperature and humidity could alter immune system response and viral survivability, hence contributing to a high viral transmission. It will also pose a challenge to vaccine developers to keep seasonality as a crucial factor in future vaccine development.

Since December 2019, COVID-19 pandemic completed a full seasonal cycle. The descriptive analysis from studies so far¹⁻³ raised the possibility of COVID-19 as temperature-sensitive. Humidity, the concentration of water vapor in the air, determines the formation of aerosols, is a significant factor in which viruses could transmit to infect new hosts. Air pollution, wind speed, latitude, precipitation, and solar radiation, are the other important factors to determine the seasonality of any respiratory viral infection, whether they are linked to COVID-19 transmission is still unclear and further studies are needed with larger data sets to investigate the viral transmission at global and local scales.

Environmental variables were considered to explain the COVID-19 seasonality such as social distancing observed in the densely populated areas. Choi *et al.*¹ collected extensive country-level data of one year pandemic time duration. Patients from five countries were evaluated and 4 variables were compared with COVID-19 spread. Those variables were temperature, humidity, air-drying capacity (ADC), and ultraviolet radiation (UV). Results showed ADC and UV were significantly correlated with COVID-19 transmission; hence providing a basis for developing frameworks related to seasonal variations in the prevalence of COVID-19 across the globe.

A systematic review by Park *et al.* found the global peak of COVID-19 during the winters with the highest positivity among children.² A study analysed four different coronaviruses, which are known to cause respiratory infections every year over a

period of 8 years.⁴ This analysis studied coronavirus occurrence and transmission in the cohort of households in Michigan.⁴ This analysis included individuals which were followed on a weekly basis to get information about respiratory illnesses. Four highly seasonal coronavirus subtypes were investigated which were OC43, 229E, HKU1, and NL63.⁴ A total of 993 coronavirus infections were detected. Subtype OC43 was the most common type and 229E was the least common. There was a striking seasonal similarity between the four types with peak aggregate months between January and February.⁴ Children under five years got the highest frequency and 260 out of 993 patients acquired the infection from an infected household member. Infection rates level when age increases which was an unusual finding.⁴ This led us to question how the current pandemic will evolve. Seasonality, even for common respiratory viruses, is a poorly understood phenomenon. While countries with temperate climates tend to have outbreaks of respiratory viruses during the colder seasons, transmission in tropical countries continues throughout the year. Also, sporadic outbreaks of respiratory viruses in the northern hemisphere in the warmer weather have been reported to be related to cruise ships and air travel.²⁻³

In conclusion, a lot remains unknown about the transmission of COVID-19. We suggest that seasonality alone will not be adequate to curb the viral transmission and other intervention measures such as social distancing are important; however, health care capacity should be levelled up to counter the surges of COVID-19 in the upcoming winter seasons. There is a need to consider seasonal factors when developing interventional strategies.

COMPETING INTEREST:

The authors declared no competing interest.

AUTHORS' CONTRIBUTION:

SS, AAM: Contributed in the development and completion of this manuscript.

Both authors approved the final version of the manuscript to be published.

REFERENCES

1. Choi YW, Tuel A, Eltahir EAB. On the environmental determinants of COVID-19 seasonality. *Geohealth* 2021; **5(6)**:e2021GH000413. doi: 10.1029/2021GH000413.
2. Park S, Lee Y, Michelow IC. Global seasonality of human coronaviruses: A systematic Review. *Open Forum Infect Dis* 2020; **7(11)**:ofaa443. doi: 10.1093/ofid/ofaa443.
3. Sajadi M. Temperature and latitude analysis to predict potential spread and seasonality for COVID-19. http://papers.ssrn.com/sol3/papers.cfm?abstract_id=3550308. Accessed March 14, 2020.
4. Monto AS, De Jonge P, Callear AP. Coronavirus occurrence and transmission over 8 years in the HIVE cohort of households in Michigan. *J Infect Dis* 2020; **222(1)**:9-16. doi: 10.1093/infdis/jiaa161.

5. Guo YR, Cao QD, Hong ZS, Tan YY, Chen SD, Jin HJ, et al. The origin, transmission and clinical therapies on coronavirus disease 2019 (COVID-19) outbreak - an update on the status. *Mil Med Res* 2020; **7(1)**:11. doi: 10.1186/s40779-020-00240-0.

Sadaf Sheikh and Amal Al-Mandhari

Department of Emergency Medicine, Sultan Qaboos University Hospital, Muscat, Oman

.....
Correspondence to: Dr. Sadaf Sheikh, Department of Emergency Medicine, Sultan Qaboos University Hospital, Muscat, Oman

E-mail: sheikh.sadaf@gmail.com

.....
Received: August 26, 2021; Revised: November 17, 2021;

Accepted: November 21, 2022

DOI: <https://doi.org/10.29271/jcpsp.2022.06.827>

• • • • •