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Can SARS-CoV-2 Global Seasonality be Determined After One Year of Pandemic?

To the Editor,

The seasonal cycle of respiratory viral diseases is widely recognized.[1] A typical seasonal pattern of annual influenza epidemics is observed during the winter season in the northern hemisphere and during the summer season in the southern hemisphere.[1,2] This knowledge has suggested that the transmission of SARS-CoV-2 could follow a similar seasonal pattern. Hence, many studies have been conducted to understand the seasonal pattern of COVID-19 since the beginning of the pandemic.[3,4] However, a common limitation is the short timeframe since COVID-19 had only been prevalent for less than a year. Consequently, previously reported seasonal patterns could be incomplete and spurious due to the short study period.[4]

The first case of SARS-CoV-2 virus infection in humans was reported in December 2019 in Wuhan, China, and expanded worldwide. It has now been a year since the World Health Organisation declared the COVID-19 pandemic on March 9, 2020, and data corresponding to a complete seasonal cycle is already available. We aim to provide a descriptive view of the SARS-CoV-2 seasonality globally, comparing patterns between geographical regions (eFigure 1; http://links.lww.com/EE/A132). We collected data on the weekly incident cases of COVID-19 between March 2020 and February 2021 from the European Centre for Disease Control including data from 214 countries (eTable 1; http://links.lww.com/EE/A132).[5] We studied the seasonality of COVID-19 in each geographical region using Poisson regression models by fitting periodic functions of time[6] and calculating the predicted weekly incidence for each area.

The first months of the pandemic were very haphazard in most countries, while some established immediate lockdowns, others took action too late or indecisively.[7,8] This fact could make data less comparable at the early stages.[9] Nevertheless, Figure 1 shows a consistent pattern in the European regions, reporting winter peaks between November and January. Similarly, some regions in the Northern hemisphere (Northern America, Northern Africa, Eastern, South-eastern, and Western Asia) also show a similar pattern. The seasonality in most regions in the Southern hemisphere and the Equator's intertropical convergence zone show a bimodal distribution with winter peaks between June and August and a second peak in January, which could be related to the appearance of new and more transmissible variants.[10] Elsewhere, winter peaks appear heterogeneous with a gradual shift from Southern Asia to Oceania.

In summary, although the seasonal pattern of COVID-19 appears to resemble other respiratory viruses, more time, and research is needed to establish its entirety. At this stage, the global changes in seasonality can be partially explained by the impact of public health interventions aiming to reduce the transmission of SARS-CoV-2[11] and potentially further complicated by the appearance of new variants.[10] However, different seasonal patterns could also be found between countries in the same geographical region. We expect the seasonal cycle of SARS-CoV-2 might become more evident in subsequent years. However, it will be necessary to consider the impact that vaccination may have on the population protective immunity[12] and any economic measures that could increase contact in the near future.

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Data sharing: Data are available open access from the European Centre for Disease Prevention and Control (ECDC) at https://www.ecdc.europa.eu/en/publications-data/data-national-14-day-notification-rate-covid-19, and the Stata syntax for the analysis is available at the GitHub repository https://github.com/aureliotobias/covidseason

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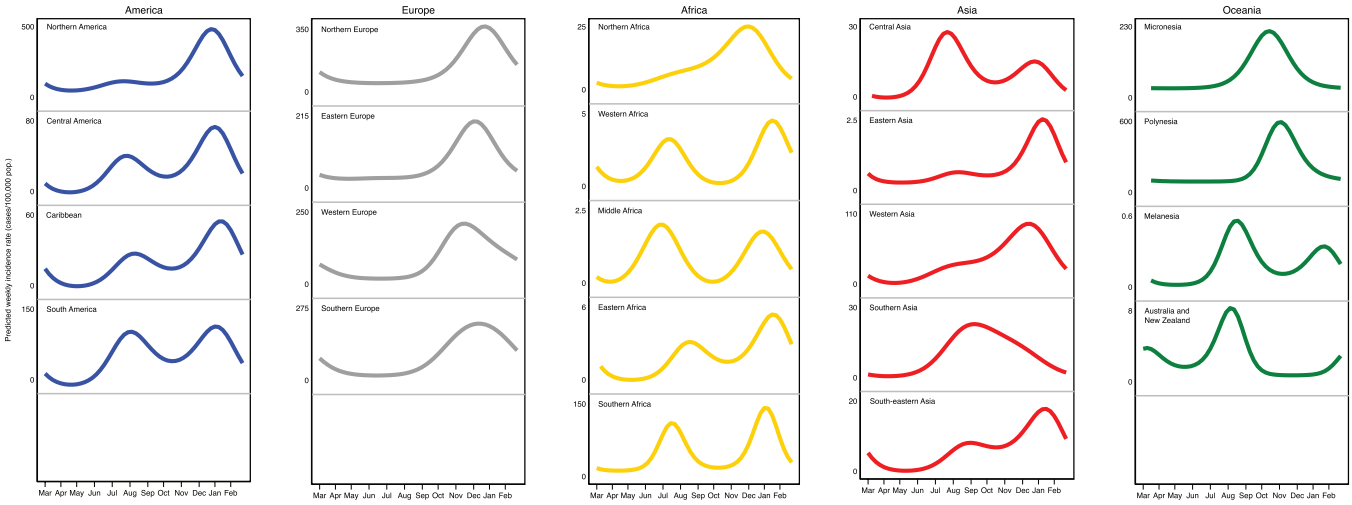

Figure 1. Estimated seasonality of COVID-19 incidence by geographical region between March 2020 and February 2021.

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