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Correspondence



Decreased seasonal influenza during the COVID-19 pandemic in temperate countries

Dear editor,

In 2019–2020 season, the coronavirus disease (COVID-19) has prevailed in many different countries. Public health authorities have taken measures to control spread of the disease, which ranged from educating the public regarding personal hygiene to suspending social gatherings and closing country borders. Efforts to control COVID-19 transmission are expected to have contributed toward controlling other communicable diseases as well, as suggested in recent study on facial masks reducing viral respiratory diseases [1]. In light of these interventions, we examined a public database containing information on seasonal influenza of temperate countries in 2019–2020 and compared it with preceding nine seasons to assess the possible differences in the influenza season during the COVID-19 pandemic.

We used the proportion of positive influenza samples as a surrogate to identify any changes in the length of the influenza season. These data were collected from the World Health Organization FluNet database [2], which provides country-level influenza surveillance records. Countries with a temperate climate, which submitted 10 years' data (from the 2010–2011 season to the 2019–2020 season) were selected. The total number of specimens processed for influenza detection and the number of positive results were recorded weekly to identify the length of the influenza season.

The first week of two or more consecutive weeks in which ≥ 2 influenza-positive specimens were detected and the proportion of positive specimens was 10% or higher was defined as the starting week of the influenza season. The last week in which the proportion of positive samples was 10% or higher, followed by two consecutive weeks with a positive proportion lower than 10%, was defined as the final week of the influenza season. If there was more than one period that matched these criteria for a given year, the longest period was selected.

For all countries, the respective annual lengths and peaks of each influenza season from 2010 to 2019 were calculated and compared with those of the 2019–2020 season. Moreover, the overall average length and peak of the season in the preceding nine years was compared with those of the 2019–2020 season using a *t*-test with SAS 9.4 software (Cary, NC, USA).

Surveillance data were collected from ten countries with temperate climate (): Belgium, Canada, France, Germany, Greece, Korea, Portugal, Spain, the United Kingdom, and the United States of America. During the nine seasons before the COVID-19 pandemic, seasonal influenza lasted between 9 and 27 weeks, with 18 weeks being the average. In the 2019–2020 season, the length of the influenza period reduced in all countries except Portugal, ranging from 8 to 18 weeks, and averaging at 14.5 weeks (data excluding Portugal). This change was statistically significant in all countries, except for Portugal and Korea (Table 1). However, Korea had an unusually short period during 2016–2017. When data from 2016 to 2017 were excluded, the 13-week long season observed in 2019–2020 also appeared to be significantly shorter than the other eight seasons.

The peak proportion of influenza-positive cases also reduced during the COVID-19 outbreak, as observed from epidemic curves (Germany and the UK were excluded because of incomplete data). Compared to the preceding years' average, a reduction of 6.1%p to 27.2%p was noted in the 2019–2020 period in all temperate countries but Canada, Greece, and the USA, where the changes were minimal and statistically insignificant; the overall average also showed a reduction of 10.43%p (*p*-value = 0.18).

The epidemic size of seasonal influenza is determined by various factors including meteorological components, interactions between pathogens, or interventions to reduce the transmission [3,4]. Meanwhile, a decrease in influenza activity during the COVID-19 has been observed in Singapore [5] and Taiwan [6] as well. The most abrupt change in this season compared to previous seasons is assumed to be public health measures to control the COVID-19, which might have influenced the seasonal influenza.

Our study has some limitations. First, the data are based on voluntary surveillance records provided public health authorities. However, we confined our study to specific countries wherein data have been submitted regularly, so our data is considered stable. Moreover, health-seeking behavior may have changed due to the COVID-19 pandemic, and influenza may not have been detected in some cases. However, a public database of confirmed influenza and COVID-19 cases (Our World in Data, <https://ourworldindata.org>) demonstrated a simultaneous increase in COVID-19 cases with a decrease in influenza cases as well as total number of surveillance diagnostic testing remaining within the range of that from previous years (data not shown): This indicates that the overall healthcare utilization may have largely remained unchanged. Also, one of the major interventions from public health authorities was to encourage people to seek medical attention, regardless of symptom severity, which means the decline in influenza is less likely due to people's reluctance on visiting clinics or lack of diagnostic testing. Further studies are required to respectively evaluate the effects of different measures implemented during the simultaneous epidemic of influenza and COVID-19.

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Table 1
Lengths of the influenza seasons during 2010–2019 and after the COVID-19 outbreak (2019–2020) in temperate countries.

Country	Duration of the influenza season (weeks)										Average (SD) duration in 2010–2019	Duration in the 2019–2020 season	Difference in the duration between 2010–2019 and 2019–2020	p-value
	2010–2011	2011–2012	2012–2013	2013–2014	2014–2015	2015–2016	2016–2017	2017–2018	2018–2019	2019–2020				
Belgium	17	15	22	21	21	25	16	17	14	18.7 (3.7)	15	3.7	0.02	
Canada	19	13	21	22	23	17	19	23	27	20.4 (4.0)	14	6.4	<0.01	
France	10	9	13	9	12	15	10	17	10	11.7 (2.8)	8	3.7	<0.01	
Germany	20	20	23	19	20	21	17	16	16	19.1 (2.4)	14	5.1	<0.01	
Greece	12	14	15	18	18	18	15	18	17	16.1 (2.2)	13	3.1	<0.01	
Korea	12	20	17	17	16	16	9	16	26	16.6 (4.7)	13	3.6	0.05	
Portugal	15	15	20	15	16	30	11	18	18	17.6 (5.3)	19	-1.4	0.18	
Spain	21	23	19	17	21	20	19	27	19	20.7 (2.9)	14	6.7	<0.01	
UK	17	19	20	17	18	22	24	22	25	20.4 (3.0)	18	2.4	0.04	
USA	19	20	23	24	21	14	18	21	19	19.9 (2.9)	17	2.9	0.02	
Average in temperate countries										18.1 (2.8)	14.5	3.6	<0.01	

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References

- [1] Liang M, Gao L, Cheng C, Zhou Q, Uy JP, Heiner K, et al. Efficacy of face mask in preventing respiratory virus transmission: a systematic review and meta-analysis. *Trav Med Infect Dis* 2020;36:101751. <https://doi.org/10.1016/j.tmaid.2020.101751>.
- [2] World Health Organization. FluNet. https://www.who.int/influenza/gisrs_laboratory/flunet/en/. [Accessed 10 October 2020].
- [3] Wiese AD, Everson J, Grijalva CG. Social distancing measures: evidence of interruption of seasonal influenza activity and early lessons of the SARS-CoV-2 pandemic. *Clin Infect Dis* 2020. <https://doi.org/10.1093/cid/ciaa834>. ciaa834.
- [4] Lee H, Lee H, Song K-H, Kim ES, Park JS, Jung J, et al. Impact of public health interventions on seasonal influenza activity during the COVID-19 outbreak in Korea. *Clin Infect Dis* 2020. <https://doi.org/10.1093/cid/ciaa672>. ciaa672.
- [5] Soo RJJ, Chiew CJ, Ma S, Pung R, Lee V, Lee VJ. Decreased influenza incidence under COVID-19 control measures, Singapore. *Emerg Infect Dis* 2020;26(8):1933–5. <https://doi.org/10.3201/eid2608.201229>.
- [6] Kuo SC, Shih SM, Chien LH, Hsiung CA. Collateral benefit of COVID-19 control measures on influenza activity, Taiwan. *Emerg Infect Dis* 2020;26(8):1928–30. <https://doi.org/10.3201/eid2608.201192>.

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