

Seasonal influenza activity in young children before the COVID-19 outbreak in Wuhan, China

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Abstract

The activity of influenza A at the end of 2019 was higher than previous two years in children younger than 6 years old in Wuhan, China. The 2019–2020 winter peak of seasonal influenza preceded the COVID-19 outbreak, with a higher and earlier peak than those of the 2017–2018 and 2018–2019 seasons. We speculate this could be due to the earlier CNY holiday season in 2019–2020 than in previous two years. We compared these results with those of two previous studies to further discuss the possible interference between influenza and COVID-19 in young children.

KEYWORDS

children, COVID-19, influenza

Dear Editor,

During the first wave of COVID-19 in China, the attack rate of coronavirus disease 2019 (COVID-19) in children was much lower than in adults, and most child cases had mild symptoms (Dong et al., 2020). However, the secondary attack rate of COVID-19 among close contacts was later found similar between children and other age groups (Bi et al., 2020). In Wuhan, Hubei province, China, there was only one paediatric case of COVID-19 officially reported before 22 January 2020. The reasons why children were exempted from COVID-19 infection in the early stage remain unclear. One hypothesis is the potential interference of seasonal influenza peaks with the newly-emerging COVID-19 outbreak among young children. Liu et al reported that 11% and 1.6% of 366 hospitalized children (≤ 16 years of age) were infected by influenza and SARS-CoV-2, respectively, in early January 2020 in Wuhan, China. Kong et al found that the incidence rate of influenza-illness-like (ILI) was substantially higher in the 2019–2020 season than in the previous two years based on the surveillance data in two hospitals in Wuhan, China. The retrospective laboratory

tests in the specimens from these ILI patients to January 2020 showed that an outbreak of seasonal influenza attacked the ≤ 30 age group in October–November 2019, followed by the COVID-19 cases in the >30 -years of age group that first emerged in December 2019 to January 2020. Surprisingly, no COVID-19 case was found in the ≤ 30 age group in their 120 samples (Table 1). Thus, there is an apparent inconsistency between the studies by Kong et al and Liu et al, as one would expect some COVID-19 cases among the young age group of ILI patients by the mid-January in Wuhan, China.

We obtained the test results of 194,672 specimens from the Maternal and Child Health Hospital of Hubei Province in Wuhan. These specimens were collected from 1 January 2017 to 20 May 2020, for immunofluorescence tests of influenza type A and B. Around 75% of the specimens were taken from the outpatients and inpatients aged ≤ 6 years old. In consistent with the findings by Kong et al, we also found a peak of influenza A in early January, coinciding with the start of the COVID-19 outbreak. It is interesting to note that the winter peak of seasonal influenza in Wuhan appeared in

TABLE 1 Influenza and COVID-19-positive tests from two studies

	Liu et al	Kong et al	Kong et al
Hospitals	One paediatric hospital and one general hospital	Paediatric inpatients and outpatients from three general hospitals	
Age	<16 years old	<30 years old	>30 years old
Sample size	366	75	45
Time	7–15 January 2020	January weeks 1–3	January weeks 1–3
Sample	hospitalized children	ILI patients	ILI patients
Influenza positive	11.80%	60%	15.6%
COVID-19 positive	1.60%	0%	20%

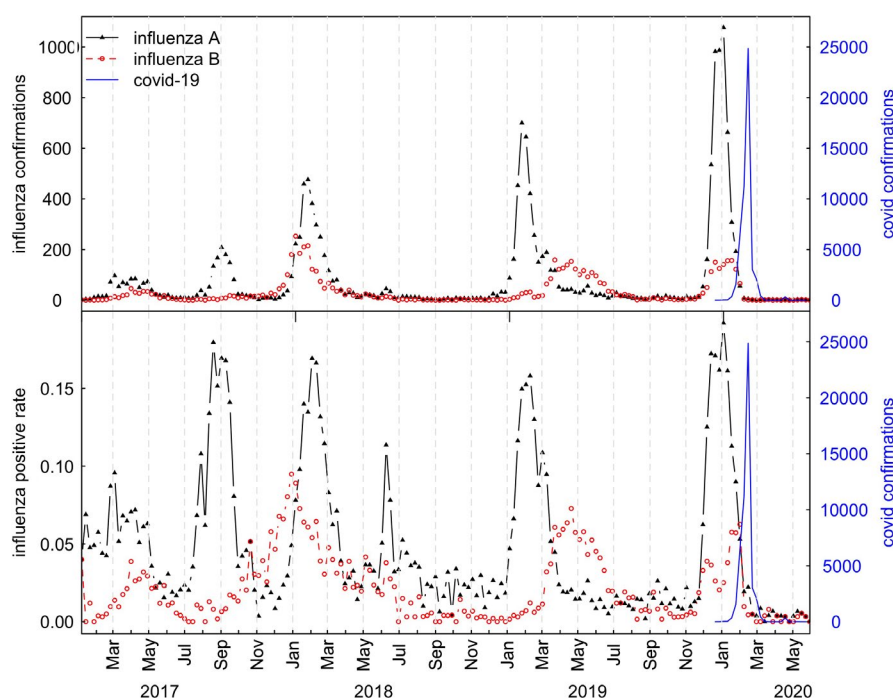


FIGURE 1 Influenza activity from January 2017 to May 2020 in Wuhan, China. The top panel shows weekly numbers of specimens positive for influenza A (black triangle) and influenza B (red square). The blue curve shows weekly numbers of reported COVID-19. The bottom panel shows weekly positive rate for influenza A and B. [Colour figure can be viewed at wileyonlinelibrary.com]

early January 2020, nearly one month earlier than those in 2017–2018 and 2018–2019. The difference in the peak time could be associated with an international event in late October, but the earlier lunar calendar cycle could be another reason (e.g. Chongyang festival was on October 28 in 2017, October 17 in 2018 and October 7 in 2019).

We observe a sudden drop of influenza A cases in early January 2020, presumably due to social distancing and avoidance of hospital visits immediately after the official report of pneumonia clusters of COVID-19 and closure of the Huanan Seafood market on 31 December 2019 (Figure 1).

Infection risk of COVID-19 was known to increase with age (Sun, Chen, & Viboud, 2020). If we assume that the ratio of COVID-19 to influenza cases in the <30 age group was not less than that in the <16 age group and similar across different hospitals, we could derive a ratio of 0.136 (1.6%/ 11.80%) based on reference (Liu et al., 2020). Given the influenza positive rate of 60% from reference (Kong et al., 2020), we would expect that around 8% of COVID-19 would have occurred in ILI patients under 30 years old. Hence, the chance of having zero COVID-19 case in the <30 age group of ILI cases, as reported in reference (Kong et al., 2020), was estimated to be very low ($0.002 = [(1-0.08)^{75}]$), given the total number of 75 specimens collected in their study for this age group.

It is of note that Kong et al collected the data from paediatric inpatients and outpatients from three general hospitals in Wuhan, whereas Liu et al collected the data from one paediatric hospital and one general hospital. *We showed that the results from samples of such size from a few hospitals could not well match with each other in the initial stage of the pandemic.* Taken together, the exemption from COVID-19 infection in the <30 age group in the early phases of the COVID-19 outbreak might have been due to underreporting whereas the potential interference between influenza and COVID-19 cannot be ruled out. Studies with a large sample size from different regions are warranted to investigate the interaction between seasonal respiratory viruses and SARS-CoV-2, particularly in children.

CONFLICT OF INTEREST

DH was supported by an Alibaba (China) Co. Ltd. Collaborative Research project. Other authors declare no conflict of interest.

AUTHORS' CONTRIBUTIONS

All authors conceived and conducted the research and wrote the draft. All authors critically revised the manuscript, and all authors approved the submission.

ETHICAL APPROVAL AND CONSENT TO PARTICIPATE

The ethical approval has been obtained from the Maternal and Child Health Hospital of Hubei Province. Individual consents were exempted as the aggregated data were used in this study.

DATA AVAILABILITY STATEMENT

All data used are from public domain.

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