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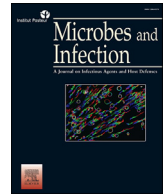
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Short communication

The COVID-19 epidemic and other notifiable infectious diseases in China

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ABSTRACT

Many infection control measures have been implemented to prevent the spread of SARS-CoV-2 during COVID-19 pandemic. We aimed to investigate the impact of COVID-19 epidemic on the other notifiable infectious diseases in China, including respiratory infectious diseases, diseases transmitted through the digestive tract and animal-borne diseases. Compared with 2019, the overall decline rate of respiratory infectious diseases in 2020 is the highest (60–90%), and the diseases transmitted by the digestive tract and animal-borne diseases are similar at 20–30%. Both hepatitis and sexually transmitted diseases decreased significantly in February, and there were basically no significant changes in other months compared with previous years. The series of measures taken by China government to prevent the spread of SARS-CoV-2 are also very effective in preventing the spread of respiratory infectious diseases. But they also have a certain degree of prevention against notifiable infectious diseases spread by other routes.

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Under the influence of COVID-19 epidemic, the activity of other infectious diseases, such as influenza and pulmonary tuberculosis could also be affected, and fluctuated different from the past [1–5]. China has formulated effective prevention and control measures based on its own actual situation, and has made great contributions to the world's epidemic prevention and control. Wearing mask, washing hands frequently, avoiding unnecessary gatherings, and suspending of working and school (mainly from February to April in 2020), all these had effectively helped us control the spread of SARS-CoV-2. We wondered whether these measures had positive impact on the other notifiable infectious diseases other than tuberculosis and influenza, therefore we searched the official website of the National Health Commission of China (<http://www.nhc.gov.cn/>) for statistics on notifiable infectious diseases, and we compared the cases during COVID-19 outbreak in 2020 vs four previous years.

We found that respiratory infectious diseases (Fig. 1A) that are mainly spread by droplets and air, such as tuberculosis, influenza, scarlet fever, measles, rubella, pertussis, and mumps, had basically maintained their lowest levels during five years after February. Compared with 2019, the overall decline rate in 2020 was 60–90%,

except for tuberculosis, which had a 15.3% decline. Unlike in the past years, which had increased cases every month, influenza began to decline sharply in February 2020, and reached a decline rate of more than 85% in winter and spring. The fluctuating trend of tuberculosis was similar to that of previous years, and it was the lowest in February, with a decrease of 38.53%. Scarlet fever dropped by 77.61% from February, and then continued to decline, and the rate of decrease remained at 80–90%, with no peak incidence in May and June as in the past. Measles, pertussis, mumps and rubella occur frequently in winter and spring usually, and are more common in children and adolescents. However, they had remained at a low level since February in 2020, without fluctuations.

For diseases transmitted through the digestive tract (Fig. 1B), the overall decline rate in 2020, which was 20–30% (except hand, foot and mouth diseases (HFMD) was 60%), was much lower than that of respiratory infectious diseases. The seasonal trend was relatively consistent over the five years, except that HFMD peaks in April–August did not exist in 2020, and it was higher in October–December than in the previous two years. The most decline in 2020 occurred in February to April, with Hepatitis A dropped by 38.38%, hepatitis E dropped by 54.17%, other infectious diarrhea dropped by 62.35%, typhoid dropped by 58.5%, acute conjunctivitis dropped by 46.89%, and 47.3% of dysentery.

As for animal-borne diseases (Fig. 1C), the decline rate in 2020 was similar with that of diseases transmitted through the digestive

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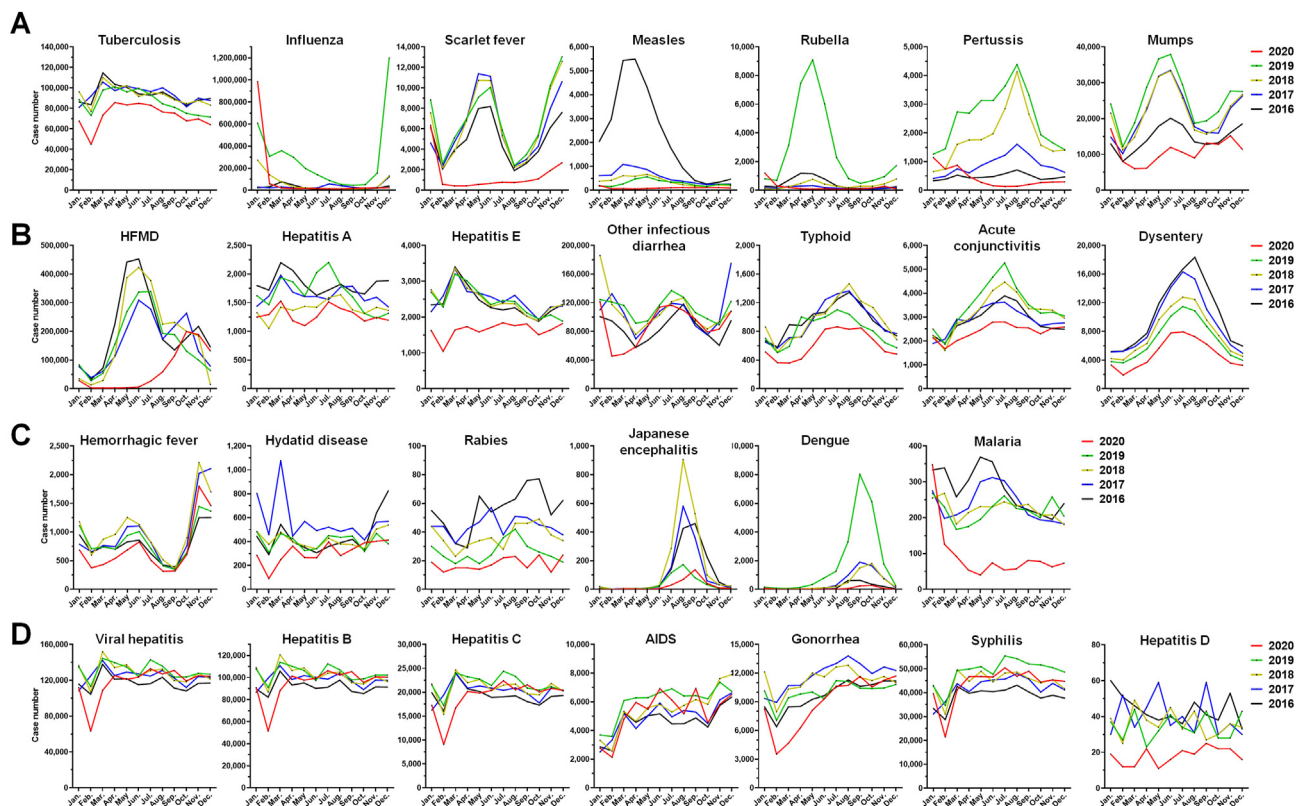


Fig. 1. Comparison of the case numbers of infectious diseases in China from 2016 to 2020. (A) respiratory diseases; (B) diseases transmitted through the digestive tract; (C) animal-borne diseases; (D) hepatitis and sexually transmitted diseases.

tract. Seasonal trends of hemorrhagic fever, rabies and hydatid disease were no different from previous years, maintaining a decreasing trend year by year. Japanese encephalitis and dengue have a small outbreak peak in summer and autumn, but the overall number of cases is less than in the past years. From February, the number of malaria cases in 2020 significantly reduced and maintained at a low level.

Viral hepatitis, hepatitis B, and hepatitis C all fell by about 45% in February, and there was basically no significant change in other months (Fig. 1D). Regarding sexually transmitted diseases, gonorrhea and syphilis decreased significantly in February, with a rate of 40–50%, and then gradually recovered from March onwards. AIDS was an increasing trend from 2016 to 2019, but it decreased in 2020 compared to 2019. The case number of hepatitis D was less than in the past each month. All these diseases had a decline of about 10% in 2020 comparing with 2019.

It seems that incidence of some viruses, such as HAV, infectious diarrhea, and HIV, in 2020 does not have significant difference to

that in 2019. For these diseases, we believe that the number of cases per month in a year meets a normal distribution, so the data is tested by t-test to compare the data difference between 2020 and 2019 (Table 1). If the Shapiro–Wilk test $P > 0.05$, the monthly average incidence data conforms to the normal distribution. The data conforming to the normal distribution uses the t test, and the others use the Wilcoxon rank sum test.

Comprehensive measures taken by China government to prevent the spread of SARS-CoV-2 are also very effective in preventing the spread of respiratory infectious diseases. But they also have a certain degree of prevention against notifiable infectious diseases spread by other routes. Measures such as frequent hand washing or disinfecting and less gathering have effectively reduced the incidence of diseases transmitted by the digestive tract. And it is possible that less going out resulting in less mosquito bites, thereby reducing the incidence of vector-borne diseases. Indeed, the COVID-19 pandemic required lockdowns in many areas and restricted access to hospitals, especially

Table 1
Statistical analysis of the two-year difference in incidence about some notifiable infectious diseases.

	2020		2019		t test		Wilcoxon rank-sum test
	Shapiro–Wilk test	P value	Shapiro–Wilk test	P value	t value	P value	P value
Hepatitis A	0.918777	0.2759	0.960366	0.789	3.9	0.0025	
Other infectious diarrhea	0.90897	0.207	0.931705	0.3985	2.56	0.0264	
Viral hepatitis	0.671868	0.0005	0.952995	0.6811			0.0113
Hepatitis B	0.659363	0.0004	0.96658	0.8719			0.0265
Hepatitis C	0.710161	0.0011	0.931966	0.4014			0.0065
AIDS	0.890584	0.1199	0.744456	0.0023			0.063
Gonorrhea	0.878674	0.0843	0.832828	0.0227			0.3754
Syphilis	0.689946	0.0007	0.839886	0.0276			0.0043

for people with non-emergent symptoms, and medical checkups have also been canceled or delayed. These could explain why several diseases, such as hemorrhagic fevers, hydatid disease, viral hepatitis, were only different during January to March, and then tend to be similar in the later months. On the other hand, people's awareness of prevention and control of notifiable infectious diseases has increased. In the war against the COVID-19 epidemic, the Chinese people are fully aware of the threat of infectious diseases to public health and the economy, and they all have learned and practiced on the intervention programs related to respiratory infectious diseases i.e. personal hygiene and protection including wearing masks in particular. In addition, the Chinese government is also taking this opportunity to further improve the public health infrastructure, which could enhance the capacity in diagnosis, treatment and management of infectious diseases. These are all helpful to the prevention and control of notifiable infectious diseases in China.

It should be noted that there were reports that excessive use of disinfectants against COVID-19 posing a potential threat to the body. Alcohol-based hand sanitizers may cause alcohol poisoning and other major health concern in children [6]. In addition, because of fear of being infected by SARS-CoV-2, patients are generally now more averse to visiting healthcare facilities unless there is compelling need. This might cause diagnostic delay for the suspected

infections of other infectious diseases and increase the unnecessary risk of transmission in households and communities.

Declaration of competing interest

None to declare.

Acknowledgements

None to declare.

References

- [1] de Souza Luna LK, Perosa DAH, Conte DD, Carvalho JMA, Alves VRG, Cruz JS, et al. Different patterns of Influenza A and B detected during early stages of COVID-19 in a university hospital in São Paulo, Brazil. *J Infect* 2020;81:104–5.
- [2] Chow A, Hein AA, Kyaw WM. Unintended Consequence: influenza plunges with public health response to COVID-19 in Singapore. *J Infect* 2020;81:68–9.
- [3] Sakamoto H, Ishikane M, Ueda P. Seasonal influenza activity during the SARS-CoV-2 outbreak in Japan. *J Am Med Assoc* 2020;323:1969–71.
- [4] Kuo SC, Shih SM, Chien LH, Hsiung CA. Collateral benefit of COVID-19 control measures on influenza Activity, Taiwan. *Emerg Infect Dis* 2020;26:1928–30.
- [5] Lai CC, Yu WL. The COVID-19 pandemic and tuberculosis in Taiwan. *J Infect* 2020;81:159–61.
- [6] Ghafoor D, Khan Z, Khan A, Ualiyeva D, Zaman N. Excessive use of disinfectants against COVID-19 posing a potential threat to living beings. *Curr Res Toxicol* 2021;2:159–68.