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Letter to the Editor

Characteristics of a family cluster of Severe Acute Respiratory Syndrome Coronavirus 2 in Henan, China

Dear editor,

We read the recent published letter by Li and colleagues in this journal with great interest, which described the potential trend of COVID-19 in China.1 Knowledge of behavior of the virus in family clusters is very informative in this context. We report 12 patients involved in a family transmission of SARS-CoV-2 which may address the importance of reducing crowds or gatherings to intercept the transmission chain.

SARS-CoV-2 has broke out across China in a tremendous scale ever since late December, 2019. Nevertheless, China seem to be alleviated a lot through effective control. Three quarters of the Covid-19 patients in China have been associated with Wuhan2 and family clusters of infected individuals have been reported.3 If the close contacts of infected patients are not properly quarantined and monitored, numerous chains of transmission will be multiplied and result in a terrible condition.4

According to the information provided by the Infection Department of Changyuan People’s Hospital, we have figured out a typical familial cluster due to an imported case from the area outside of Wuhan. The complete timeline of the contacts, symptoms and laboratory findings of the two families are illustrated clearly in the figure and all patients have tested negative twice for SARS-CoV-2 before we wrote this paper.

The index patient flew back from Hangzhou on January 23, 2020 and interacted with the first family. Through the contact tracing of the whole family, she turned out to be the one who spread the virus to the other seven in her incubation period as tested positive for SARS-CoV-2 on February 3, but it remained unclear how she got infected. The first family held reunions twice on the second day of her arrival and three days later respectively and lasted for two hours each time.

Patient 2 was the first one who developed fever and cough, then followed by Patient 1 who were febrile with nausea and myalgia two days before extensive gross glass-like radiological changes identified in chest CT. Patient 3 showed similar symptoms with SARS-CoV-2 like imaging abnormalities detected just as patient 2 did. It’s obvious that all three persons lived together with the index patient, which meant that they were exposed to the virus much longer than others and they all developed the disease and typical imaging changes.

In addition, the onset of the disease emerged several days later for patient 6. As the link between the two families, patient 7 acted as the second generation source of transmission and infected five people in the second household. Curiously, she had a dry cough and fever not long after the short exposure, which we think it may be related to her own immune status.

Additionally, we can see from the figure that four patients manifested with related symptoms and abnormal medical examination findings but negative nucleic acid results. False negative results can occur in cases of insufficient viral load, improper sampling or poor kit sensitivity.5 Based on their epidemiological history, clinical symptoms and CT changes, they were confirmed with the diagnosis of Covid-19.

We found four asymptomatic infections in the two families aged nine to sixty, which were not limited to young people with strong immune status as supposed.

The number of cases illustrated above has taken up more than half of all cases in Changyuan City with a population of less than 800 thousand. The asymptomatic carriers, pre-clinical and clinically mild patients should be vigilant about as they can easily hide in the community. Effective quarantine is a task of priority for people who have a travel experience or develop related symptoms. We hypothesize that people are more likely to develop a disease when contact with the infected ones longer, especially in a rather small limited space. (Fig. 1) and (Table 1)

This study was approved by the local institutional review board, and written informed consent was obtained from all patients.

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Table 1

| Patient | Exposure duration | Incubation period |
|---------|-------------------|------------------|
| Patient 2 | 66 hours | 58 hours | 59 days | 55 days | 34 days |
| Male | Male | Male | Female | Male | Female |
| 9 | 12 | asymptomatic | asymptomatic | 13 | 9 |

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Fig. 1. Timeline of family cluster cases of SARS-CoV-2 infection in Changyuan City, Henan Province, China. The contact information, clinical symptoms and laboratory testing results of 12 patients are included.

Contributors

CLZ and YNJ designed the study. WXN collected the data. YNJ, QW and HZ analyzed and interpreted the data. YNJ and QW wrote the article. LM and CLZ revised the draft.

Declaration of Competing Interest

None.

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