

A COVID-19 Transmission within a family cluster by presymptomatic infectors in China

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Abstract

We report a COVID-19 family cluster caused by a presymptomatic case. There were 9 family members, including 8 laboratory-confirmed with COVID-19, and a 6-year-old child had no evidence of infection. Amongst the 8 patients, one adult and one 13-month-old infant were asymptomatic, one adult was diagnosed as having severe pneumonia.

Key words:

COVID19, family cluster, presymptomatic infectors

Abbreviations

SARS-CoV-2, severe acute respiratory syndrome

COVID-19, novel coronavirus 2019

ICU, intensive care unit

Since the novel coronavirus (SARS-CoV-2) was identified in early December 2019, the number of cases has been rapidly increasing[1]. Chan and colleagues reported the SARS-CoV-2 in a family setting with person-to-person transmission[2]. We are here reporting a family cluster of coronavirus disease 2019 (COVID-19) transmission and clinical features in Zhejiang China, after a visit to a temple.

On January 19th, a couple went to participate a temple activity to celebrate the Chinese Spring Festival. The 58-year-old woman (index 1) fell ill with fever, fatigue and headache on 24th January. However, the 60-year-old man (index 2) was without any symptoms.

In between the temple visit and the onset of symptoms, the couple's daughter and her family (son-in-law, and two grandchildren; cases 1 to 4) had visited and stayed with them from 20th to 23th January. Index 1 went to hospital on 26th, and was diagnosed with COVID-19 on 29th by reverse transcription-polymerase chain reaction (RT-PCR).

Index 2 and cases 1 to 4 were all admitted to hospital as persons under investigation on the day Index 1's diagnosis was confirmed. The daughter (case 1) presented fever and cough on the 27th January, and became diagnosed with having COVID-19 after being tested positive by RT-PCR using throat swab specimen.

On 1st February, index 2 was tested positive via throat swab RT-PCR but stayed asymptomatic. Case 1's husband (case 2) started to suffer fever and was laboratory diagnosed on the same day. The 6-year-old daughter (case 3) showed no symptoms and tested three times negative for throat swab and one time negative for rectal swab by RT-PCR, and remained clear in chest CT scans. She was the only family member who was uninfected by SARS-CoV-2. The 13-month-old daughter (case 4) was asymptomatic but was laboratory-confirmed on 5th February.

On January 23rd, before index 1 showed any symptoms, cases 1 to 4 had dinner with case 2's mother (case 5) and father (case 6), and grandmother (case 7). They were admitted to hospital as persons under observation on 1st February, they were laboratory-confirmed to have contracted COVID-19 on 2nd, 5th and 6th February, respectively. Case 6 was a 57-year old man, he was transferred to intensive care unit (ICU) as the symptoms got worse and the level lactic acid had gotten higher and higher (as shown in Figure).

This series of laboratory-confirmed cases of COVID-19 were diagnosed in the Zhejiang province, which lies outside Wuhan. Firstly, although they were from three households they all were infected directly or indirectly from the same two index patients. The clinical features were diverse across patients, particularly there were two asymptomatic patients and one

whose symptoms was so severe that he had to be transferred to ICU. Secondly, this cluster demonstrated that COVID-19 is transmittable during the incubation period, as the daughter and her family caught the disease during incubation period of index 1 and index 2. Thirdly, patients can stay asymptomatic, such as index 2 and case 4 in this cluster. Given that Zou et al[3] had found that the viral load of symptomatic and asymptomatic patients were similar, asymptomatic patients can still infect others. These “silent patients” may remain undiagnosed and be able to spread the disease to large number of people. Lastly, it appears that children may not be as susceptible to this new virus as adults and elderly, and they may fare better when they have contracted the virus. As reported in this family cluster, the 6-year-old child was not infected and the 13-month-old was infected but stay asymptomatic.

In summary, there are variations across individuals in the clinical manifestations of COVID-19. From our reports, we should pay attention to how to prevent people from being infected by asymptomatic patients and patients who were in their incubation period.

Declaration

Authors' contributions

LPW, XQC collected the data. QGQ, NBY conceived the idea and drafted the paper. AM reviewed the paper. XMC conceived the idea. All authors read and approved the final manuscript.

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The study has been reviewed and approved by the Medical Ethical Committees (2020-R018).

Disclaimer

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Competing interests

The authors declare that they have no competing interests.

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Figure legend:

Timeline of exposure to index patients with COVID-19 in China

Figure 1

