

# Epidemiological analysis of 18 patients with COVID-19

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**Abstract. – OBJECTIVE:** The present study aimed to explore the transmission pattern and the incubation period of coronavirus disease 2019 (COVID-19) as well as the clinical characteristics of infants with COVID-19 to provide a scientific basis for introducing further measures to reduce the infection rate and control the pandemic.

**PATIENTS AND METHODS:** A descriptive epidemiological study of 18 patients with COVID-19 in People's Hospital of Deyuan was carried out. Among these patients, 16 cases were connected with clusters (11 family-cluster cases and 5 public-cluster cases). The basic characteristics, clinical symptoms, and epidemiological characteristics of the patients were considered in the investigation.

**RESULTS:** The median age of the 18 patients was 44.5 years (37.5-52.0 years), and there were 10 males and 8 females in the sample. The main clinical symptoms were fever and cough. The epidemiological characteristics were as follows: (1) the median incubation period was 8 days (with an interquartile range of 4-12 days); (2) the incubation period in one case was  $\geq 18$  days; (3) one infant patient was asymptomatic prior to their diagnosis; and (4) two asymptomatic patients had a positive nucleic acid test after their family members were diagnosed with COVID-19.

**CONCLUSIONS:** COVID-19 can be transmitted in many ways, including via respiratory droplets and indirect contact, and it spreads easily among close contacts. People with a history of contact with areas affected by the disease should be isolated at home for 14 days. Moreover, attention should be focused on the issues of asymptomatic infectors, asymptomatic infants, and infants with mild symptoms.

*Key Words:*

COVID-19, Epidemiology, Clustered cases, Asymptomatic infection, Infants and young children.

## Introduction

Since the first cases of COVID-19 were reported in Hubei province in December 2019, the number of cases has increased rapidly<sup>1</sup>. The disease has spread to many provinces (municipalities,

autonomous regions, and special administrative regions) of China and been transmitted rapidly all over the world<sup>2</sup>. In China alone, by 24:00 on April 9, 2020, there were 1,160 confirmed cases, 81,865 cumulative reported confirmed cases, 3,335 cumulative patient deaths, and 77,370 cumulative discharged cases<sup>3</sup>, indicating the serious impact of the disease on people's health and the country's economic and social development. The World Health Organization officially named the disease "coronavirus disease 2019" on February 11, 2020<sup>4,5</sup>. The Law of the People's Republic of China on the Prevention and Control of Infectious Diseases stipulates that COVID-19 is a class B acute respiratory infectious disease, but that it should be managed according to the rules for a class A infectious disease<sup>6</sup>. In the present study, we retrospectively analyzed the epidemiology, transmission pattern and clinical characteristics of 18 patients with COVID-19 in People's Hospital of Deyuan in Sichuan province. The aim of the research was to provide data and evidence to support the local government in formulating effective epidemic prevention and control strategies.

## Patients and Methods

### *Selection of Research Objects*

Based on the COVID-19 Control Scheme (6<sup>th</sup> Edition) published on March 7, 2020 by the National Health and Wellness Commission<sup>7</sup>, 18 patients with COVID-19 admitted to People's Hospital of Deyuan in Sichuan province between January 24, 2020 and February 13, 2020 were selected as the research objects, 16 of whom represented cases connected with clusters.

### *Methods*

A sheet specifically designed for tracking the course of COVID-19 and a consultation sheet for recording the relevant first-aid and epidemiological information were used in the present study. The general characteristics, epidemiological histories

and disease symptoms of the 18 patients in the sample were included in the data collection. All the investigators had received stringent identical technical training prior to conducting the study.

## Results

### *General Characteristics and Clinical Symptoms*

The median age of the 18 patients with COVID-19 was 44.5 years (37.5-52.0 years), and the sample comprised 10 males and 8 females. The main clinical symptoms were fever and cough, which were similar to the clinical and epidemiological characteristics described in a previous study<sup>8</sup>. All the patients with first-generation cases had been to the epidemic area, while all

those with second-generation cases had been in contact with individuals who had returned from the epidemic area (Table I).

### *Incubation Periods*

The median incubation period was 8 days (interquartile range: 4-12 days). However, since the patients with first-generation cases mainly lived and worked in the epidemic area (Cases B, C, D1, D2 and E lived in Wuhan, Hubei; Cases F, G and H lived in Jingzhou, Hubei; and Case I had returned from their home town of Jingzhou, Hubei), the contact time points of the first-generation cases were not known; consequently, the exact incubation period of these cases could not be ascertained. In the present study, the incubation period was defined as the time from a patient leaving the epidemic area to the emergence of symptoms;

**Table I.** Basic information and clinical features of 18 cases of new coronary pneumonia.

Clinical features	First-generation cases (N=9)	Second-generation cases (N=9)	Total cases (N=18)
<i>Ages</i>			
<i>Median of age</i>	47 (31-49)	44 (43-66)	44.5 (37.5-52)
0-14 years	1	1	2
15-49 years	6	5	11
50-64 years	1	0	1
≥65 years	1	3	4
<i>Percentage of women (%)</i>	44	44	44
<i>Median of incubation period</i>	10.5 (4-12)	8 (7-9)	8 (4-12)
<i>First symptoms</i>			
Fever	2	4	6
Cough	1	3	4
None	2	1	3
Diarrhea	0	2	2
Headache and dizziness	2	0	2
Stool changes	1	1	2
Fatigue	1	0	1
<i>Main clinical signs</i>			
Cough	3	5	8
Fatigue	3	4	7
Fever	3	4	7
Cough up sputum	1	3	4
Dry cough	1	2	3
Headache and dizziness	3	0	3
General ache	0	2	2
Diarrhea	0	2	2
Short of breath	1	1	2
Sore throat	0	1	1
Loss of appetite	0	1	1
Spit up milk	0	1	1
Chest pain on the right side	0	1	1
<i>History of exposure to sources of infection</i>			
Live in Wuhan	5	0	5
Live in Jinzhou	3	0	3
Recently visited Jingzhou	1	0	1
Exposure to returnees from affected areas	0	9	9

however, the actual incubation period could be longer. Furthermore, it was noted that the incubation period of Case I was at least 18 days.

### ***Asymptomatic Infectors***

The term “asymptomatic infectors” refers to individuals who show no clinical symptoms but test positive for the etiology of COVID-19 or for the serum-specific immunoglobulin M antibody. Asymptomatic infectors are identified mainly through the screening of close contacts of known patients, epidemic cluster investigation, and source-tracking programs<sup>7</sup>. It has been reported that asymptomatic infectors can spread the disease<sup>9</sup>, since they carry the virus and have the potential to infect others. However, it is difficult to identify them owing to their lack of clinical symptoms. In the present study, Cases G and H were asymptomatic infectors when their family member (Case F) was admitted to the hospital on January 31 with a confirmed diagnosis of COVID-19. They were both subsequently admitted to the hospital on February 6, each with a confirmed diagnosis of COVID-19.

### ***Clustered Cases***

In our study, 16 patients represented cases connected with clusters (11 family-cluster cases and 5 public-cluster cases), accounting for 89% (16/18) of the sample. Among the family-cluster cases, three patients had returned from the epidemic area. In addition, all nine patients with first-generation cases had been in contact with other family members since returning from the epidemic area. Among the public-cluster cases, all the patients with second-generation cases had been in contact with people who had returned from Wuhan prior to the onset of COVID-19. Furthermore, the first-generation cases among the cluster cases had all returned from areas affected by the epidemic ([Supplementary Table](#)). COVID-19 can be transmitted *via* respiratory droplets, indirect contact, the fecal-mouth route, and in aerosol form<sup>[7]</sup>. In cases where individuals have an infected patient in their home, and in locations where there are large clusters of people, such as at parties and on public transport, there is a high risk of a clustered epidemic. Therefore, for people returning from areas affected by the epidemic, home isolation and medical observation should be undertaken regardless of whether they are (or appear) ill. Room ventilation and personal health protection should be given adequate attention, individuals should wear face masks when going out and should wash

their hands frequently, and people should avoid attending parties and dining together.

### ***Infant Infections***

Case  $c_2$ , a male aged one month and seven days from Mianzhu, was the grandson of Case C and the son of Case  $c_1$ . Case  $c_2$ 's contact history showed contact with Case C on January 21. His nucleic acid test was positive on February 10, and the infant was admitted on February 13, with no obvious symptoms having developed in the interim period. His clinical symptoms after hospitalization were cough, diarrhea, and vomiting.

According to reports, to date, there have been relatively few cases of infants diagnosed with COVID-19, which may be due to the low probability of exposure to the virus (cases being mainly caused by family-cluster exposure), or to the inability to identify such cases, since they may have mild symptoms or even be asymptomatic<sup>10-11</sup>. The infant infection in the current study was a case resulting from family-cluster transmission, and there were no evident symptoms prior to admission to hospital. This demonstrates that if there is one infected person in a family, other family members who have been in contact with them should go to a hospital or a relevant facility immediately to undergo testing. Furthermore, particular attention should be focused on infants, since the initial symptoms of infection in this age group are often not obvious.

## **Discussion**

At present, the confirmed transmission routes of COVID-19 include droplet transmission, contact transmission, and air transmission, and its spread through fecal-mouth transmission requires further investigation<sup>12</sup>. The incubation period is typically between 10 and 14 days, with a maximum period of up to 24 days. The first-generation cases among the clustered cases in the present study were mainly people who had returned from epidemic areas, indicating that such people should be isolated at home for 14 days.

Most of the previous studies claim that to control the epidemic, 99% of cases could be identified within a 14-day isolation period<sup>13</sup>. Moreover, studies suggest that the median incubation period could be longer. Approximately 10% of patients with COVID-19 may still have symptoms after a 14-day incubation period<sup>14-17</sup>. In the present study, while the median incubation period was 8 days

(4-12 days), in Case I, it was longer than 18 days. It can therefore be inferred that even after being isolated for 14 days following their return from an area affected by the epidemic, people should still remain vigilant. It is necessary to wear face masks when going out and try to avoid close contact with other people.

## Conclusions

Asymptomatic infectors are mainly identified through screening of close contacts of patients with confirmed cases of COVID-19, clustered epidemic investigation, and tracking of the source of infections, since even though people have no clinical symptoms, they still carry the virus. Therefore, if there are observed cases within an individual's family or among colleagues and friends with whom they have had close contact, they should attend a hospital or relevant facility to undergo a nucleic acid test immediately.

There are few cases of infants diagnosed with COVID-19, which may be due to the inability to identify such cases because of the mild symptoms displayed in the initial stages of the disease. Consequently, particular attention should be focused on identifying infants with COVID-19. Furthermore, adult caregivers should wash their hands before having close contact with the infant, wear face masks, and regularly disinfect the infant's toys and tableware<sup>11</sup>.

## Conflict of Interests

The authors declare that they have no conflict of interests.

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