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Original Article

Epidemiological and clinical characteristics of 136 cases of COVID-19 in main district of Chongqing



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KEYWORDS

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Background: We did a comprehensive exploration of the epidemiological and clinical characteristics of 136 patients with confirmed COVID-19 in main district of Chongqing which was adjacent to the west of Hubei province.

Methods: This study was conducted on 136 patients with COVID-19 in main district of Chongqing from Jan 25 to Feb 20, 2020. Data of patients included demographic, epidemiological, clinical features, chest radiographs of imported cases, local cases, second-generation cases and third-generation cases. Student's t-test was adopted for quantitative variables while Pearson Chi-squared test or Fisher's exact test for categorical variables.

Results: The median age was 47 years and common symptoms of illness were cough (50.7%), fever (47.1%) and fatigue (14.0%). The time from contact symptomatic case to illness was 7.7 days, and 88 patients (64.7%) were cluster cases, radiological evidence found bilateral lung involvement was common (57.4%). Compared with the imported cases, the local cases were significantly older, the proportion of men is lower. There was higher proportion of cluster cases in local cases. Unlike imported cases, which fever was the dominant symptom, the local cases have more cough patients, with a significant higher proportion of asymptomatic patients. The third-generation cases have a significant higher proportion of asymptomatic patients.

Conclusion: We concluded the epidemiological and clinical characteristics of the cases and suggested to take more comprehensive measures for screening patients, especially for elderly person, avoid family gatherings, and implement more closely surveillance of suspect patients and their close contacts.

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Introduction

In December 2019, cases of pneumonia appeared in Wuhan, Hubei province, China. The etiology of these infections was defined 2019 novel corona virus diseases (COVID-19).^{1,2} By February 20, 2020, there have been 74680 accumulated confirmed cases of COVID-19 infections, of them 544 patients were found in Chongqing which was adjacent to the west of Hubei province. The previous literatures have analyzed the epidemiological and clinical characteristics of cases in Wuhan and Hubei province.^{3–7} However, there were no characteristics of cases reported in cities adjacent to Hubei province. Chongqing located in Southwest of China, bordering on the western of Hubei Province. Since first COVID-19 patient, who returned to Chongqing from Wuhan was confirmed in January 21, 2020, the number of COVID-19 patients in Chongqing increased daily. Besides the number of imported COVID-19 cases, the amounts of local COVID-19 cases were increased gradually. The Epidemiological and clinical characteristics in patients with COVID-19 has not understood well so far. In this study, we did a comprehensive exploration of the epidemiological and clinical characteristics of 136 patients with confirmed COVID-19 admitted to several tertiary hospitals in main district of Chongqing to provide basis for prevention protocol for this disease.

Methods

Ethical declaration

This study was conducted in accordance with the Declaration of Helsinki. This case series was approved by the institutional ethics board of Chongqing Emergency Medical Center (No. 202005). This research was a retrospective and analyzed using anonymous clinical data.

Data collection

Data were analyzed from 136 patients of COVID-19 who were transferred to the designated hospitals in main district of Chongqing from Jan 25 to Feb 20, 2020. The definition of cases was as follows. The data of patients included demographic (age, gender), epidemiological (days from contact to illness onset, days from illness to admitted, clustering), clinical features (fever, cough, fatigue, dyspnoea, headache), chest radiographs for the patients. We described and compared epidemiological and clinical data between imported cases and local cases, second-generation cases and third-generation cases. Two independent reviewers extract data and evaluate the eligibility of the original data was applied. All data were analyzed by another two researchers.

Case definitions

A confirmed case was defined as a suspected case with the laboratory test for the COVID-19 from the respiratory specimens show positive result by the real-time reverse-transcription-polymerase-chain-reaction (RT-PCR) assay,

while a suspected case was defined according to the diagnosis and treatment protocol for COVID-19.⁸ The imported cases were defined as cases those patients from Wuhan or surrounding areas in Hubei province before illness onset. The local cases were defined as cases those patients have not left Chongqing, and the infection site belongs to main district Chongqing. The second-generation cases were defined as the local cases those patients direct contacted with confirmed patients who from Wuhan or surrounding areas before illness onset. The third-generation cases were defined as the local cases those patients direct contacted with confirmed patients who has not left Chongqing before illness onset.

Statistical analysis

Data were presented as a mean (standard deviation) for continuous variables if they are normally distributed or as median (Inter Quartile Range) if they are not, and percentages (rate %) for categorical variables. Statistical analysis was assessed using Students't-test (quantitative variables) and Pearson Chi-squared test or Fisher's exact test (categorical variables). SPSS (version 22.0, Chicago, IL, USA) was used for all analyses. A P-value < 0.05 was considered to be statistically significant.

Results

General information

The study included 136 patients who were identified as a confirmed COVID-19 infection in main district of Chongqing. Table 1 summarized characteristics for the 136 patients. The median age was 47 years (IQR 37–61), 4 patients (2.9%) were children younger than 12 years old, 21 patients (15.4%) were over 65 years, and 69 patients (50.7%) were males. The common symptoms of illness were cough (50.7%), fever (47.1%) and fatigue (14.0%). The time from contact symptomatic case to illness, which is called the incubation period, was 7.7 days, from illness to admitted was 2.9 days. In all the 136 patients, 88 patients (64.7%) were cluster cases, including 75 patients (75/88, 85.2%) were family cluster cases. And, radiological evidence found bilateral lung involvement was common (57.4%).

Characteristics between imported cases and local cases

Comparison of epidemiological and clinical characteristics between the imported cases and local cases were further conducted in Table 1. In all the 136 patients, 29 patients (21.3%) were imported cases. The median age was 39 years (IQR 30–49), and 20 patients (69.0%) were males, while those for the local cases were 49 years (IQR 38–63) and 49 patients (45.8%) were males, showing statistically difference in age and gender. The age range of local cases was mainly between 45 and 64 years (46/107, 43.0%), which was 13–44 years in imported cases (18/29, 62.1%). There were no significant differences regarding epidemiological data, including days from contact to illness, days from illness to

Table 1 The epidemiological and clinical characteristics of COVID-19 in imported cases and local cases.

Characteristics	All cases (N = 136)	Imported cases (N = 29)	Local cases (N = 107)	P Value
Age, Median (range), years	47(37–61)	39(30–49)	49(38–63)	0.02
Age groups, n (%)				
1-12	4(2.9)	0(0.0)	4(3.7)	0.01
13-44	54(39.7)	18(62.1)	36(33.6)	
45-64	57(41.9)	11(28.2)	46(43.0)	
≥65	21(15.4)	0(0.0)	21(19.6)	
Male, n (%)	69(50.7)	20(69.0)	49(45.8)	0.03
Days from contact to illness	7.7 ± 4.1	6.7 ± 4.1	8.4 ± 4.1	NS
Days from illness to admitted	2.9 ± 2.5	2.4 ± 2.4	3.1 ± 2.5	NS
Cluster cases, n (%)	88(64.7)	8(27.6)	80(74.8)	0.00
Symptoms, n (%)				
Fever	64(47.1)	24(82.8)	40(37.4)	0.00
Cough	69(50.7)	17(58.6)	52(48.6)	NS
Fatigue	19(14.0)	2(6.9)	17(15.9)	NS
Dyspnoea	13(9.6)	5(17.2)	8(7.5)	NS
Headache	12(8.8)	2(6.9)	10(9.3)	NS
Asymptomatic	30(22.1)	1(3.4)	29(27.1)	0.00
Bilateral involvement of chest radiographs	78(57.4)	19(65.5)	59(55.1)	NS

NS: not significant.

admitted. There was higher proportion of cluster cases in imported cases (80/107, 74.8%), which was statistically significant with imported cases (8/29, 27.6%). In imported cases, cluster cases were most common in families (69/80, 86.3%). Clinical data revealed that the most common symptoms of imported cases was fever (82.8%), followed by cough (58.6%). However, in 108 local cases, the most common symptoms were cough (48.6%), followed by fever (37.4%). The proportion of patients with fever reached statistical significance between two cases, as patients in imported cases were more likely to fever. The incidence of asymptomatic sign was only 3.4% in imported cases (1/29 patients), which was lower than that in local cases (29/107,

27.1%). While the incidence of bilateral lung involvement showed no significant difference between imported cases and local cases.

Characteristics between second-generation cases and third-generation cases

Comparison of epidemiological and clinical characteristics between the second-generation cases and third-generation were conducted in Table 2. In all the local cases, 18 patients were local second-generation cases, while 72 patients were local third-generation cases. There were no significant difference regarding age, gender, days from contact to illness,

Table 2 The clinical characteristics of COVID-19 in second-generation cases and third-generation cases.

Characteristics	Second-generation cases (18)	Third-generation cases (72)	P Value
Age, Median (range), years	53(38–63)	49(32–66)	NS
Age groups, n (%)			
1-12	0(0.0)	4(5.6)	NS
13-44	7(38.9)	23(31.9)	
45-64	9(50.0)	28(38.9)	
≥65	2(11.1)	17(23.6)	
Male, n (%)	10(55.6)	30(41.7)	NS
Days from contact to illness	7.9 ± 4.0	8.8 ± 4.4	NS
Days from illness to admitted	3.2 ± 2.6	2.6 ± 2.0	NS
Symptoms, n (%)			
Fever	11(61.1)	21(29.2)	0.01
Cough	9(50.0)	32(44.4)	NS
Fatigue	4(22.2)	8(11.1)	NS
Dyspnoea	2(11.1)	6(8.3)	NS
Headache	1(5.6)	6(8.3)	NS
Asymptomatic	2(11.1)	27(37.5)	0.03
Bilateral involvement of chest radiographs	10(55.6)	37(51.4)	NS

NS: not significant.

days from illness to admit between second-generation cases and third-generation cases. The most common symptoms of illness were fever (61.1%) in second-generation cases, which were cough (44.4%) in third-generation cases. The proportion of patients with fever reached statistical significance between two cases, as patients in second-generation cases were more likely to fever. The incidence of asymptomatic sign was 11.1% in second-generation cases (2/18 patients), which was lower than that in third-generation cases (27/72, 37.5%). There was also no significant difference regarding the incidence of bilateral lung involvement between second-generation cases and third-generation cases.

Discussion

The COVID-19 outbreak in China was the third outbreak caused by a coronavirus since the 21st century, and the number of infected people has exceeded the previous SARS and MERS.^{9–11} With the strengthening of diagnosis, treatment, prevention and control of disease, patients diagnosed with COVID-19 in Wuhan and surrounding areas in Hubei province have achieved good effects; however, how to prevent the spread of COVID-19 in other regions was another important issue. Although there have been a large number of researches on the epidemiology and clinical characteristics of the COVID-19, the researchers were mainly from Wuhan,^{3–6} and the local epidemiology of the COVID-19 in imported cities was extremely scarce. The epidemiological and clinical characteristics of local cases and imported cases were still unclear, which hindered the assessment of the potential of the COVID-19 to spread outside Wuhan and made the epidemic prevention and control in imported cities more complicated. We conducted a statistical comparison of the epidemiological and clinical characteristics of imported cases and local cases in main district of Chongqing, hoping to provide guidance in preventing local epidemics, and to provide a reference for the development of prevention and control measures in other provinces and regions. This research provided epidemiological and clinical characteristics of 136 confirmed COVID-19 patients in main district of Chongqing. Among the 136 confirmed patients, the age was mainly concentrated in the age of 13–64. There was no difference in the incidence between male and female. The clinical characteristics were still mainly cough, fever, and fatigue. The above characteristics were not significantly different from those in Wuhan and Hubei province.^{3,4,6} In 136 patients, 29 were imported cases (21.3%) and 107 were local cases (78.7%). We found that with the spread of COVID-19 in main district of Chongqing, the number of confirmed local cases has exceeded the number of imported cases. Compared with imported cases, local cases were characterized by older age, more females, cluster transmission, and family gathering cross-infection was more common.^{12–14} The clinical symptoms of local cases are mainly cough rather than fever. The proportion of asymptomatic patients was higher. There are no differences in indicators such as incubation period, days from illness to admitted and bilateral lung injury. As per published article, the major symptoms of COVID-19 infection remain same and mainly cough, fever and dyspnea. In mild to severe stage, patients have mild fever,

dyspnea and mild hypoxemia on day 10 of initial illness with bilateral infiltrating pneumonia in chest X-ray. This characteristic features coincided with the first confirmed COVID-19 case in the china and U.S. as well.¹⁵

COVID-19 can spread from human to human,^{13,16,17} but there were no comparison of characteristics in different generation. We divided 107 local patients into second-generation cases and third-generation cases according to the previous definition. We found that the third-generation cases had a lower rate of fever and a higher proportion of asymptomatic symptoms. We consider that it may be related to the more serial passage of COVID-19, the less pathogenic it became.^{18,19} Alternatively, some of the asymptomatic third-generation cases might be still in the pre-symptomatic stage because of their shorter follow-up time compared with the second-generation cases. Further clinical follow-up and laboratory studies would be required to provide more data for answering this important questions. Moreover, this phenomenon suggested that with the spread of COVID-19 in main district of Chongqing, the symptoms of patients before illness become more and more insidious, and clinical symptoms such as fever cannot be used as the exclusive early identification factor of the COVID-19. For suspected patients and their close contacts, surveillance is an important measure for local prevention.^{20,21} As a municipality directly under the central government, Chongqing was adjacent to the west of Hubei province and 940 km away from Wuhan. It has a population of about 31 million, of which the main district has a population of about 8.55 million. There were frequent personnel flow between Chongqing and Wuhan, and the situation of epidemic prevention and control was severe. By comparing imported cases with local cases, second-generation cases and third-generation cases, we can better detect the typical and evolutionary characteristics of the disease, and formulate effective and targeted measures. For example: take more comprehensive measures for screening patients, especially for elderly person, avoid family gatherings, and implement more closely surveillance of suspect patients and their close contacts.^{12,22–24}

Compared with the imported cases of the COVID-19 infection, the local cases were significantly older; the proportion of men is lower. There was higher proportion of cluster cases in local cases. Unlike imported cases, which fever was the dominant symptom, the local cases have more cough patients, with a significant higher proportion of asymptomatic patients. Compared with second-generation cases, the third-generation cases have a higher proportion of patients with cough rather than fever. The third-generation cases have a significant higher proportion of asymptomatic patients. It implied illness may not be accompanied by any of the acute signs but may appear insidiously in third-generation. In summary, the characteristics of imported and local cases of COVID-19 in main district of Chongqing were different. Local cases were older and were mainly females. The family gathering cross-infection was more common in local cases. In addition, the cough was dominant symptoms than fever. With the increase generation in population spread and more concealed symptoms. AS COVID-19 spread from generation to generation, it implied illness may not be accompanied by any of the acute signs but may appear insidiously. It was suggested to take more comprehensive

measures for screening patients, especially for elderly person, avoid family gatherings, and implement more closely surveillance of suspect patients and their close contacts. It is hoped that characteristics of cases and prevention protocol in main district of Chongqing could provide a reference for other provinces and regions. This research represented the characteristics of early cases of COVID-19 in main district of Chongqing, which has certain limitations. Firstly, we only collected the data that were transferred to the designated hospitals in main district of Chongqing. In order to obtain more accurate results, it was better to extend the collection of more patient data. Secondly, the observation period of this research was only 26 days, which was relatively short. The clinical laboratory examination results, cure rate, mortality and other indicators need further observation.

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Declaration of Competing Interest

The authors have no conflicts of interest relevant to this article.

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