A New Features of SARS-CoV-2 Infection in Wenzhou, China

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Abstract

BACKGROUND: An outbreak of pneumonia associated with the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) was initially emerged in Wuhan city, and subsequently spread throughout China. Then the epidemic is rapidly circulating in a few other countries at present. So it is very urgent to delineate the clinical characteristics of these affected patients. METHODS: To investigate the epidemiological characteristics of this new Coronavirus Disease 2019 (COVID-19), a cross-sectional study was executed with 459 patients with confirmed COVID-19 in Wenzhou, China, from January 27 to February 12, 2020. RESULTS: The median age of all patients was 48.0 years, and 46.8% were females. 37.5% of patients had a history of residence in Wuhan. Fever (72.1%) and cough (43.6%) were the most frequent symptoms. We also found that there were three kinds of unconventional patients including 4.4% of total confirmed patients who were asymptomatic, 7.8% patients who had no link to Wuhan city but contact with individuals from Wuhan without any symptoms at the time of contact, and 10.7% who had no link to Wuhan city nor a history of intimate contact with patients or individuals from Wuhan without any symptoms, respectively. CONCLUSIONS: Our findings presented the possibility of asymptomatic carriers affected with SARS-CoV-2, and this phenomenon suggested that chances of uncontrollable transmission in the larger population might be higher than formerly estimated, and transmission by these three kinds of unconventional patients in Wenzhou may be one of the characteristics of infection in other Chinese cities outside the Wuhan epidemic area.

Background

It has been a month since a number of cases of life-threatening pneumonia associated with the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) were reported in
Wuhan, China on December 31, 2019[1, 2]. In the past a few days, the epidemic were rapidly spread other Chinese cities and circulating in a few other countries in the world[3–5]. An increasing number of epidemiological evidence indicated that person-to-person transmission in hospital and family settings were observed[6–8], suggesting a formidable challenge of prevention and control for this novel coronavirus pneumonia (NCP). Recently, the World Health Organization has declared the Corona Virus Disease 2019 (COVID-19) as a “Public Health Emergency of International Concern” and officially termed this NCP as Corona Virus Disease 2019 (COVID-19). As of February 6th, 2020, 31,161 confirmed cases with COVID-19 were reported in mainland China[9]. Apart from Wuhan city, other major cities in China has been likely to be experience localized outbreaks and other countries[10, 11]. Despite the rasch propagate worldwide, the clinical characteristics of SARS-CoV-2 have not been fully clarified. Huang et al first reported the cases of COVID-19 in which most patients had a history of exposure to Huanan Seafood Wholesale Market[2]. And Wang et al identified patients with COVID-19 had common symptoms included fever, fatigue and dry cough[1]. Furthermore, several case reports confirmed the peculiarity of human-to-human transmission to COVID-19[6, 7]. To better understand and control the SARS-CoV-2 outbreak, an updated analysis of this epidemic in other China area is urgently warranted. As of February 8th, except for Hubei Province, the slowdown of the increase rate of confirmed patients and suspected patients, also indicated that the measures and strategies of prevention and control have proven effective, such as Wenzhou city[12]. However, there also are evidences that indicated the epidemic situation in some city might potentially shift from the import stage to the community spread stage in the coming time period. And the emergence of unconventional patients also suggested that we need to be alert to the trend of the epidemic shifting from the import stage to the community spread stage, while continuing or implement the
measures and strategies of prevention and control to stop the spread of SARS-CoV-2.

Materials And Methods

Data collection

All Epidemiological, clinical and laboratory characteristics and outcomes information were obtained with data collection forms from Wenzhou Municipal Health Commission (Website: http://wjw.wenzhou.gov.cn/). The case with SARS-CoV-2 was confirmed by high-throughput sequencing or real-time reverse-transcriptase polymerase-chain-reaction (RT-PCR) assay according to the official guidelines[13]. The patients were divided into severe and non-severe groups according to the American Thoracic Society guideline on admission[14].

Statistical analysis

Continuous variables were presented using mean and standard deviation or median and interquartile range (IQR) as appropriate, and categorical variables were described as frequency rates and percentages. All statistical analyses were performed using SPSS (Statistical Package for the Social Sciences) version 16.0 software (SPSS Inc).

Results

Characteristics of the studied patients

Of all 490 patients recruited as of January 12th in Wenzhou city, 31(6.3%) patients were excluded due to the incompleteness of original reports (including clinical outcomes and symptoms), and 459(93.7%) remanent patients had completed characteristics and were described in Table 1. The median age was 48 years (IQR, 37–56; range, 2–93 years), and 215 (46.8%) were females. The median time from onset to diagnosis was 6.0 days (range: 0–23 days). Of these patients, 42(9.2%) were severe patients and 417(90.8%) were non-severe patients. Fever (72.1%) and cough (43.6%) were the most common symptoms, whereas diarrhea or castalgia (3.3%) were rare. 172 (37.5%) patients had a history of
New features of SARS-CoV-2 in Wenzhou differencing from Wuhan

The point worth noting about this novel coronavirus pneumonia in Wenzhou city, is that the emergence of three kinds of unconventional patients. As shown in Table 1 and Fig. 1, there were 20 asymptomatic patients accounted for 4.4% of the total patients, 36 (7.8%) patients who have no link to Wuhan city but contact with individuals from Wuhan without any symptoms at the time of contact and 49 (10.7%) patients who have no link to Wuhan city nor a history of intimate contact with patients or individuals from Wuhan without any symptoms, which suggests that the possibility of asymptomatic carriers. We divided all patients into two groups, one with a history of residence and travel in Wuhan and one
without, and then made a time distribution chart based on the time of onset of diseases. As indicated in Fig. 2, in addition to the change in number of patients with a history of residence and travel in Wuhan, we can see the change of number of patients with no link to Wuhan.

Moreover, there was an outbreak of infection in a public place at the Yintai world trade center in Wenzhou (Fig. 3). On January 20, a 39-year-old saleswoman went to local hospital for treatment by herself after breaking out with a fever at 38.5°C, accompanied with chills, dizziness and headache, and symptoms of soreness and fatigue. She was subsequently diagnosed with the novel coronavirus (SARS-CoV-2) pneumonia on January 28, but the source of which is unknown. As of the date of publication, a total of 16 additional patients resulting from this mall have been confirmed, namely two staff members, two sales persons, one janitor, nine customers, and two individual outside the mall but close contact with one of the above. All these evidences indicated that the epidemic situation in Wenzhou might potentially shift from the import stage to the community spread stage in the coming time period. However, the slowdown of the increase rate of new patients, also indicated that the measures and strategies of prevention and control in Wenzhou have proven effective. (Fig. 4).

Discussion

In the current study with totally 459 patients with COVID-19 in Wenzhou, we found that there were the emergence of three kinds of unconventional patients including 4.4% patients with asymptomatic, 7.8% who have no link to Wuhan city but contact with individuals from Wuhan without any symptoms at the time of contact, and 10.7% who have no link to Wuhan city nor a history of intimate contact with patients or individuals from Wuhan without any symptoms, indicated that the COVID-19 presence and prevalence may be underestimated at present.
Along with the epidemic of SARS-CoV-2 spreads rapidly throughout China and worldwide, more concerns and new strategies should be undertaken in the next a few days[15]. It is untoward to differentiate and screen patients with atypical symptoms, and the rapid human-to-human transmission among close contacts is a crucial peculiarity for SARS-CoV-2[7, 16]. Wenzhou has become the city with the most patients of SARS-CoV-2 outside of Hubei Province in China[12]. We found a emergence of unconventional patients with COVID-19, and this phenomenon suggested that chances of uncontrollable transmission in the larger population might be higher than formerly estimated, and asymptomatic transmission may be one of the characteristics of infection in other area. The epidemic characteristics of SARS-CoV-2 in Wenzhou may be typical of the outbreaks in other Chinese cities outside Wuhan. Besides, since the outbreak of SARS-CoV-2 in a public place in Wenzhou city occurred, this is a typical incidence of outbreak that should be of great concern.

The epidemic situation might potentially shift from the import stage to the community spread stage in the coming time period. Although the slowdown trends of the increase number of new patients in recent days, we need to find and control the infection source of patients affected with SARS-CoV-2[8, 17]. In light of the emergence of unconventional patients, and Diagnosis and Treatment of Pneumonitis Caused by New Coronavirus (trial version 5) published by China National Health Commission [13] indicated that asymptomatic infected individuals may also be the source of infection, and there were evidences that asymptomatic infections has a certain infectivity[8]. Based on the above, it suggested that suspected patients should include patients with clinical symptoms and who, in the history of epidemiology, intimate contact with individuals from Wuhan, although these Wuhan individuals are not confirmed cases and without any symptoms at the time of contact. So far, our understanding of the epidemic characteristics of SARS-
CoV-2 is still insufficient, and we still need to track the development closely, further collect and analyze information through epidemiological investigations.

Conclusions

In summary, the epidemic characteristics of SARS-CoV-2 in Wenzhou may be typical of the outbreaks in other Chinese cities outside Wuhan. The asymptomatic infected individuals has a certain infectivity and may be the source of infection. Therefore, we need to be alert to the trend of the epidemic shifting from the import stage to the community spread stage, while continuing or implement the measures and strategies of prevention and control to stop the spread of SARS-CoV-2.

Abbreviations

SARS-CoV-2: Severe acute respiratory syndrome coronavirus 2
NCP : Novel coronavirus pneumonia
COVID-19: Corona virus disease 2019
IQR: Interquartile range

Declarations

Ethics approval and consent to participate
This study was approved by the Ethics Committee of Guangzhou Medical University.

Consent for publication
Not applicable.

Availability of data and materials
The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Competing interests
The authors declare no competing interests.
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Authors’ contributions

HJZ and JCL designed the study. BQR collated the data, and TGL analyzed epidemiologic data. DDW and DW contributed to interpreting the results.

HJZ wrote the manuscript and analyzed the results. XXL, FMQ and ZCY revised the manuscript. All authors read and approved the final manuscript.

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Figures
Figure 1

The emergence of three kinds of unconventionally confirmed cases with COVID-19.

Figure 2

According to the date of onset of symptoms, the temporal distribution of cases with and without a history of residence and travel in Wuhan.
An outbreak of infection in a public place at the Yintai world trade center in Wenzhou.
According to the date of confirmed diagnosis, the temporal distribution of confirmed cases by the nucleic acid detection by RT-qPCR.