Observational Study

Medicine

OPEN

Clinical characteristics of the delta variant of COVID-19 in Jingmen, China

Fangfang Bie, MM[a], Wensheng Yuan, MM[b], Yafeng Chen, MD[c], Qijun Gao, MD[c,*]

Abstract

There has been an epidemic of the severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2) delta variant in Jingmen, China, and the clinical and epidemiological characteristics of all patients infected with SARS-CoV-2 delta variant in an epidemic are rarely reported. All the coronavirus disease 2019 (COVID-19) patients diagnosed in Jingmen in August 2021 were enrolled in this study. Epidemiological data and clinical characteristics were analyzed. Of 58 patients (38 male and 20 female), 11 were children. The mean age was 35 years, and the median age was 39 years (range, 1–60 years; interquartile range, 28–51). The infectivity of the SARS-CoV-2 Delta variant may have increased, but pathogenicity could have decreased significantly. The vast majority of patients had either no symptoms or mild symptoms. Even though the variant virus is highly contagious, control measures have proven effective. Symptoms included fever (53%), cough (48%), headache (6%), runny nose (13%), loss of smell and taste (6%), elevated C-reactive protein (26%), increased neutrophil count (13%), decreased eosinophil count (21%), and elevated mononuclear granulocytes (26%). Thirty-eight of the 47 adults showed lymphocyte decline, but none of the children showed a significant decline, and more than half of them showed an increase. Thirty patients had no pneumonia, 27 patients had mild pneumonia, and only one patient with multiple chronic diseases had severe pneumonia. None of the 11 children had been vaccinated, 10 did not have pneumonia, and 1 had a small lung lesion. The number of new patients disappeared in 15 days after the lockdown of the city.

Abbreviations: COVID-19 = the coronavirus disease 2019, SARS-CoV-2 = severe acute respiratory syndrome coronavirus-2, RT-PCR = real-time reverse transcription polymerase chain reaction.

Keywords: COVID-19, delta variant, infectious disease

1. Introduction

The outbreak of a novel coronavirus was first reported on December 31, 2019. The World Health Organization designated it severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2) and termed it the coronavirus disease 2019 (COVID-19).[1–3] COVID-19 was declared a global pandemic after the SARS-CoV-2 spread rapidly in a growing number of countries.[4] By August 31, 2021, over 200 million people were infected with COVID-19, with 4.5 million deaths reported worldwide.[5]

The Delta variant of SARS-CoV-2 was originally identified in India in December 2020 and has since been detected in about 60 countries.[6] It has a potentially higher rate of transmission than the original strain due to its greater ability to evade the host's immune system.[7–9]

China eliminated all cases of COVID-19 through strict control measures, but cases were later introduced as large numbers of returnees entered the country.[10] In July 2021, new COVID-19 cases were confirmed among custodial staff working at Lukou International Airport in Nanjing, China, and cases rapidly increased and spread to several cities across the country.[11]

Jingmen, a city of about 800,000 people in central Hubei province, is 250 kilometers from Wuhan. In January 2020, the COVID-19 outbreak occurred in Jingmen for the first time. It was eradicated within two months by strict prevention and control measures, and no new cases were reported for more than one year.[12]

Through routine nucleic acid testing of people returning from Wuhan, a new COVID-19 case was confirmed in Jingmen on August 4, 2021. The government immediately conducted nucleic acid tests on all citizens, and the city was locked down two days later. All markets were closed, and all citizens, except for medical workers and public servants, were banned from leaving their homes. Daily necessities were ordered online and distributed by public servants. After two weeks of lockdown, no new cases were reported. A total of 58 people were directly or indirectly infected. The SARS-CoV-2 Delta variant was determined to be responsible for these infections, and epidemiological

FB and WY contributed equally to this work.

This study was supported by the General Science and Technology Project of Jingmen Science and Technology Bureau.

The authors have no conflicts of interest to disclose.

The datasets generated during and/or analyzed during the current study are available from the corresponding author on reasonable request.

[a] Department of Dermatology, The First People's Hospital of Jingmen, Jingmen, Hubei Province, P.R. China, [b] Emergency Department, Jingzhou Central Hospital, Jingzhou Hospital Affiliated to Yangtze University, Jingzhou, Hubei Province, P.R. China, [c] Department of Cardiology, The First People's Hospital of Jingmen, Jingmen, Hubei Province, P.R. China.

**Correspondence: Qijun Gao, Department of Cardiology, The First People's Hospital of Jingmen, Jingmen, Hubei Province 448000, P.R. China (e-mail: gaoqijun2008@sina.com).*

How to cite this article: Bie F, Yuan W, Chen Y, Gao Q. Clinical characteristics of the delta variant of COVID-19 in Jingmen, China. Medicine 2022;101:38(e30812).

Received: 10 June 2022 / Received in final form: 28 August 2022 / Accepted: 30 August 2022

http://dx.doi.org/10.1097/MD.0000000000030812

investigation confirmed that the outbreak had been indirectly transmitted from Nanjing.

Previous studies have shown that people infected with the SARS-CoV-2 Delta variant have high rates of hospitalization, severe illness, and mortality.[13–15] However, because most of the patients in these studies were hospitalized, asymptomatic infections and some mild cases may not have been included, and the clinical and epidemiological characteristics of all patients in an outbreak have rarely been reported.

2. Methods

Patients: All 58 cases were confirmed at Jingmen First People's Hospital from August 4, 2021, to August 25, 2021. They were all from the downtown area of Jingmen. This study was approved by the Ethics Committee of Jingmen First People's Hospital. Verbal consent was obtained from the patients before data collection.

Procedures and methods: Clinical data were collected from the patients' medical records, including gender, age, COVID-19 vaccination history, clinical manifestations, laboratory examination, lung computed tomography, treatment, and prognosis; the prognosis was counted up to October 29, 2021. If more information was required, we communicated with the attending physician, the patients, and their family. Throat swabs were obtained from the upper respiratory tract for real-time reverse transcription polymerase chain reaction (RT-PCR). The Wuhan Institute of Virology provided the RT-PCR detection reagents.

Statistical analysis: SPSS 19.0 was used for statistical analysis. Continuous variables are represented as mean ± SEM, median, and interquartile range values, while categorical variables are represented as frequency and percentage.

3. Results

Of the 58 cases (38 male and 20 female), 11 were children. The mean age was 35 years, and the median age was 39 years (range, 1–60 years; interquartile range, 28–51, Fig. 1). Three of them had chronic diseases, including hypertension, diabetes, and heart failure. The number of new patients gradually decreased and eventually disappeared after 14 days under the control measures (Fig. 2).

The symptoms included fever (53%), cough (48%), headache (6%), runny nose (13%), elevated C-reactive protein (26%), increased neutrophils (13%), decreased eosinophils (21%), elevated mononuclear granulocyte (26%). The mean lymphocyte count in children was $4.30 \pm 0.97 \times 10^9$/L, with a significant increase in 6 out of 11 cases, while in adults it was $1.06 \pm 0.66 \times 10^9$/L, with a decrease in 38 out of 47 cases. There were 30 patients with no noticeable infection symptoms on the lung computed tomography. One of the 28 patients with pneumonia had severe symptoms, with dilated cardiomyopathy, type 2 diabetes, hypertension, and lung lesions affecting more than 30% of the lung surface area (Fig. 3D), whereas the remaining had only small localized lesions (Fig. 3A–C).

Thirty-three patients had recently received two doses of the COVID-19 vaccine, while 11 patients had received only one dose. Three adults were unvaccinated, two had a mild lung infection, and one was critically ill with multiple diseases.

None of the 11 children had been vaccinated, 10 did not have pneumonia, and one had a small lung lesion.

All patients tested positive for COVID-19 antibodies within 10 days, including immunoglobulins M and G (IgM and IgG). It took 20 to 45 days for the test of SARS-CoV-2 RT-PCR to turn negative.

Currently, there is no definite effective treatment for COVID-19.[16] The main treatment medications are abilol oral (0.2 g thrice daily), interferon atomization, and traditional Chinese medicine treatments.

Most of the cases were confirmed within one week after the city was lockdown, no new case was reported after August 20 2021.

4. Discussion

COVID-19 has been a pandemic for more than 2 years, and a variety of mutated viruses have emerged.[17,18] Since most countries have never completely stopped the spread of COVID-19, many variants of SARS-CoV-2 can coexist in these countries, and it is difficult to obtain comprehensive clinical data on patients infected with a single variant. In contrast, China succeeded in halting the transmission of COVID-19 a year ago, but there have since been small outbreaks, which have usually been contained within a month. Such outbreaks are generally caused

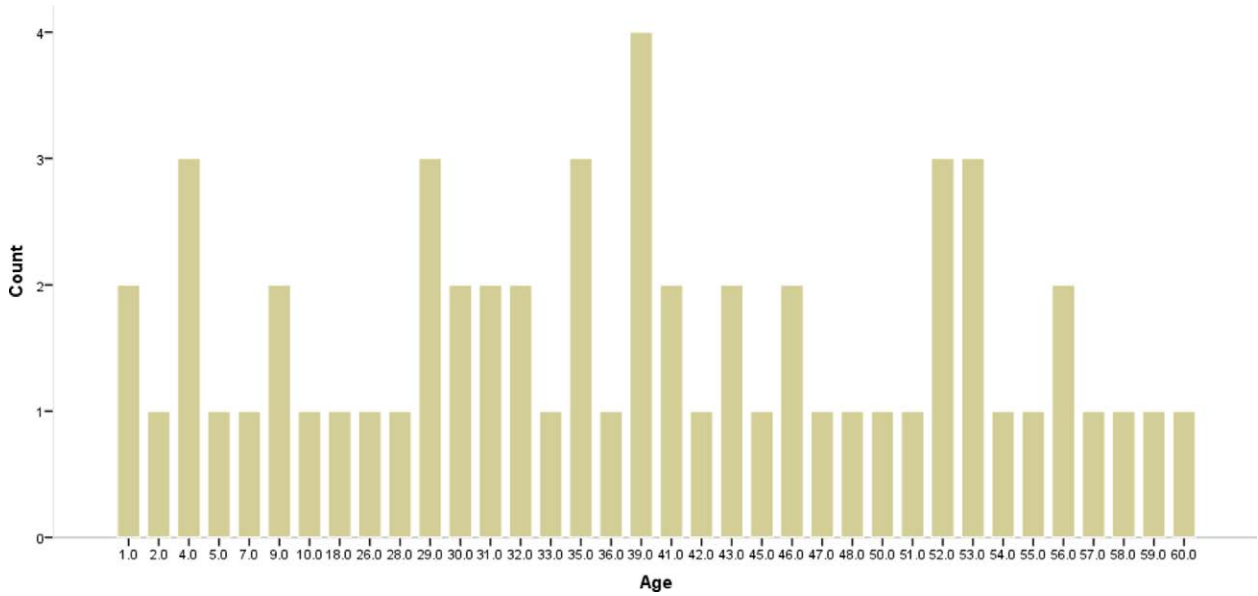

Figure 1. Age distribution of patients with laboratory-confirmed COVID-19. COVID-19 = the coronavirus disease 2019.

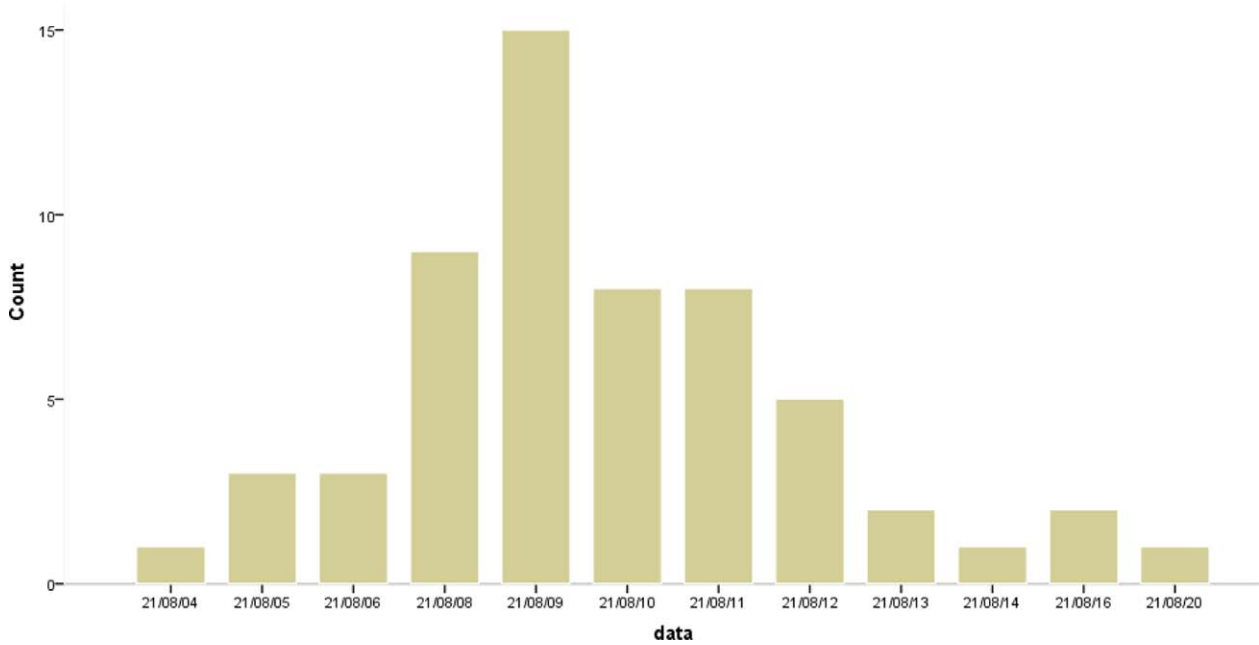

Figure 2. Date of illness onset distribution of patients with COVID-19. The lockdown of the city began on August 7, with most cases occurring in the following week. COVID-19 = the coronavirus disease 2019.

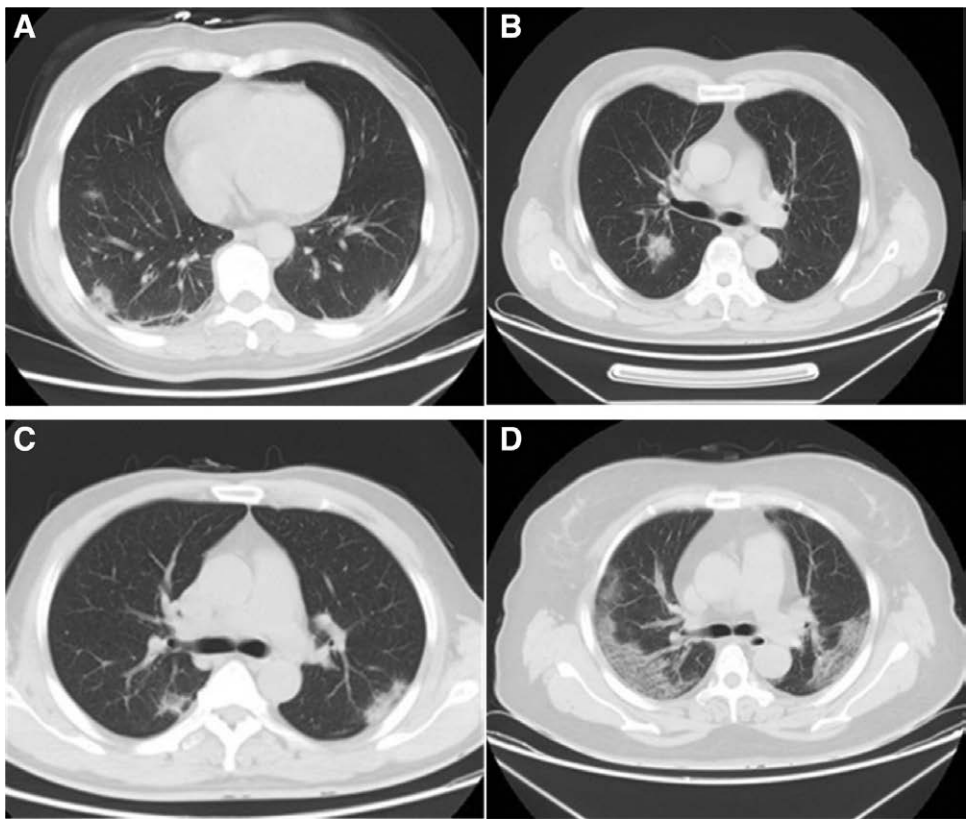

Figure 3. Lung CT of COVID-19 patients: A, B, C are from three mild patients; D is from severe patients. CT = computed tomography, COVID-19 = the coronavirus disease 2019.

by a single variant, which can be identified by testing a single specimen.

The first COVID-19 outbreak in Jingmen lasted from January 4 to February 28, 2020, and one-third of the patients were infected outside the city of Jingmen. The city was locked down two weeks after the first case was reported. On average, one person infected two others.[12] The situation was similar in other countries. In Romania, the epidemiological characteristics of 147 early cases confirmed between February 22, 2020, and April 2, 2020 were reported, of which 60% patients were infected from other countries and only 40% were locally infected.[19]

During the second COVID-19 outbreak in Jingmen, all patients were confirmed within two weeks of the initiation of the prevention and control measures, indicating that the outbreak of the Delta variant of COVID-19 could be completely blocked. In one week, 57 cases resulted from direct or indirect infection by the first patient, suggesting that, as reported in other studies,[6] the Delta variant was significantly more infectious than the original virus.

We reported 219 cases of COVID-19 during the first outbreak in Jingmen in 2020. Of these, the majority involved lung lesions, 33 were critically severe, and 11 resulted in death.[12] Other cities experienced similar situations at the same time.[20] The condition of the infected patients this time was evidently different—most of them were asymptomatic, while others had only some symptoms of an upper respiratory tract infection, such as fever and cough. There were a total of 28 patients with lung lesions; except for one severe case in which the patient had a high number of infectious lesions in both lungs, the other 27 patients had only small localized lesions. In China, all the patients were admitted to the hospital because of the appropriate protective conditions in the hospital, which go a long way in ensuring that the virus will not be transmitted to others. If infectivity is not considered, only one patient needs to be hospitalized. The situation was similar in other cities. By August 19, 2021, 153 confirmed cases of the SARS-CoV-2 Delta variant had been reported in Wuhan, including 67 asymptomatic cases, 85 mild cases, and 1 severe case.[21] In Yangzhou City, Jiangsu province, there were 570 confirmed cases of the SARS-CoV-2 Delta variant from July 28 to August 26, 2021, with 9 severe cases and no deaths.[22]

COVID-19 is often associated with lymphocytopenia,[23] and most adults in our study had lymphocytopenia. However, we discovered that the children's lymphocytes did not decline significantly and that some of them increased significantly. The increase in the lymphocyte number may be related to the children's mild disease.

This study has several shortcomings: First, the number of patients is relatively small; second, the transmission chain is concentrated on the colleagues, residential communities, and friends of the first patient as well as the children of the infected person. Therefore, most of the patients were individuals between 30 and 60 years of age and their children.

In conclusion, the infectivity of the SARS-CoV-2 Delta variant may have increased, but pathogenicity could have decreased significantly. The vast majority of patients had either no symptoms or mild symptoms. Even though the variant virus is highly contagious, control measures have proven effective.

Author contributions

The study was designed by QG and SY, FB, and YC collected the epidemiological and clinical data and processed statistical data. FB drafted the manuscript. QG contributed to critical revision.
Conceptualization: Fangfang Bie.
Data curation: Fangfang Bie.
Formal analysis: Fangfang Bie.
Funding acquisition: Fangfang Bie.
Investigation: Fangfang Bie.
Methodology: Wensheng Yuan.
Project administration: Wensheng Yuan.
Resources: Wensheng Yuan.
Software: Wensheng Yuan, Yafeng Chen.
Supervision: Yafeng Chen.
Validation: Yafeng Chen.
Visualization: Qijun Gao.
Writing – original draft: Qijun Gao.
Writing – review & editing: Qijun Gao.

References

[1] Baloch S, Baloch MA, Zheng T, et al. The coronavirus disease 2019 (COVID-19) pandemic. Tohoku J Exp Med. 2020;250:271–8.
[2] Lu H, Stratton CW, Tang YW. Outbreak of pneumonia of unknown etiology in Wuhan, China: the mystery and the miracle. J Med Virol. 2020;92:401–2.
[3] Zhu N, Zhang D, Wang W, et al. A novel coronavirus from patients with pneumonia in China, 2019. N Engl J Med. 2020;382:727–33.
[4] Cucinotta D, Vanelli M. WHO declares COVID-19 a pandemic. Acta Biomed. 2020;91:157–60.
[5] World Health Organization. WHO Coronavirus disease 2019 (COVID-19) Situation Report on 30 August 2021. Available at: https://www.who.int.
[6] Shiehzadegan S, Alaghemand N, Fox M, et al. Analysis of the Delta Variant B.1.617.2 COVID-19. Clin Pract. 2021;11:778–84.
[7] Alizon S, Haim-Boukobza S, Foulongne V, et al. Rapid spread of the SARS-CoV-2 Delta variant in some French regions, June 2021. Euro Surveill. 2021;26:2100573.
[8] Erhabor GE. The Challenges of Delta Variant (COVID-19) and Assisted Reproductive Therapy. West Afr J Med. 2021;38:609.
[9] Mishra A, Kumar N, Bhatia S, et al. SARS-CoV-2 delta variant among asiatic lions, India. Emerg Infect Dis. 2021;27:2723–5.
[10] Zhang Y, Shi L, Chen H, et al. Policy disparities in response to the first wave of COVID-19 between China and Germany. Int J Equity Health. 2021;20:86.
[11] Liu Y, Yang B, Liu L, et al. Occupational characteristics in the outbreak of the COVID-19 delta variant in Nanjing, China: rethinking the occupational health and safety vulnerability of essential workers. Int J Environ Res Public Health. 2021;18:10734.
[12] Gao Q, Hu Y, Dai Z, et al. The epidemiological characteristics of 2019 novel coronavirus diseases (COVID-19) in Jingmen, Hubei, China. Medicine (Baltim). 2020;99:e20605.
[13] Funk T, Pharris A, Spiteri G, et al. Characteristics of SARS-CoV-2 variants of concern B.1.1.7, B.1.351 or P.1: data from seven EU/EEA countries, weeks 38/2020 to 10/2021. Euro Surveill. 2021;26:2100348.
[14] Luo CH, Morris CP, Sachithanandham J, et al. Infection with the SARS-CoV-2 delta variant is associated with higher recovery of infectious virus compared to the alpha variant in both unvaccinated and vaccinated individuals. Clin Infect Dis. 2021;18:ciab986.
[15] Sheikh A, McMenamin J, Taylor B, et al. SARS-CoV-2 Delta VOC in Scotland: demographics, risk of hospital admission, and vaccine effectiveness. Lancet. 2021;397:2461–2.
[16] Majumder J, Minko T. Recent developments on therapeutic and diagnostic approaches for COVID-19. AAPS J. 2021;23:14.
[17] Islam OK, Al-Emran HM, Hasan MS, et al. Emergence of European and North American mutant variants of SARS-CoV-2 in South-East Asia. Transbound Emerg Dis. 2021;68:824–32.
[18] Choi JY, Smith DM. SARS-CoV-2 Variants of concern. Yonsei Med J. 2021;62:961–8.
[19] Hâncean MG, Perc M, Lerner J. Early spread of COVID-19 in Romania: imported cases from Italy and human-to-human transmission networks. R Soc Open Sci. 2020;7:200780.
[20] Wang B, Wang Z, Zhao J, et al. Epidemiological and clinical course of 483 patients with COVID-19 in Wuhan, China: a single-center, retrospective study from the mobile cabin hospital. Eur J Clin Microbiol Infect Dis. 2020;39:2309–15.
[21] COVID-19 situation in Hubei Province on August 19, 2021. Available at: http://wjw.wuhan.gov.cn/ztzl_28/ fk/yqtb/ 202108/ t20210820_1763647.shtml.
[22] Shen S, Li W, Wei H, et al. A chess and card room-induced COVID-19 outbreak and its agent-based simulation in Yangzhou, China. Front Public Health. 2022;10:915716.
[23] Huang W, Berube J, McNamara M, et al. Lymphocyte subset counts in COVID-19 patients: a meta-analysis. Cytometry A. 2020;97:772–6.