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Research Article

Epidemiological Analysis of Asymptomatic SARS-CoV-2 Novel Coronavirus Infection Cases in Yinchuan City of Ningxia

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Abstract: ***Objective:*** To analyze the epidemiological characteristics of asymptomatic SARS-CoV-2 novel coronavirus infection cases in Yinchuan City, Ningxia. ***Methods:*** Cases of asymptomatic SARS-CoV-2 novel coronavirus infections discovered in Yinchuan City from February 2020 to April 2020 were taken as the research subjects, epidemiological and laboratory examination data were collected, and statistics and analysis were conducted. ***Results:*** Among the 10 cases of asymptomatic infection, 6 were males and 4 were females, with an average age of (34.3±2.1) years; 2 cases had a history of living in Hubei, 8 cases had a history of close contact with confirmed cases; 6 cases had no other underlying diseases while the other 4 cases were accompanied by one or more underlying diseases; 6 cases were diagnosed as asymptomatic infection by serum-specific IgM antibody detection; 4 cases were diagnosed as asymptomatic infection by throat swab testing; there were 4 cases with alanine base transferase level higher than the normal range, 2 cases with aspartate aminotransferase level higher than the normal range, and 3 cases with D-dimer level out of the normal range. ***Conclusion:*** The asymptomatic SARS-CoV-2 novel coronavirus infection has certain clinical characteristics; it is infectious and has insidious characteristics. Even if medical observation is dismissed, monitoring is still needed to prevent the pandemic from rebounding.

Keywords: Yinchuan City of Ningxia; COVID-19; Asymptomatic infection; Epidemiological characteristics

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At the end of 2019, a kind of pneumonia pandemic caused by a new type of coronavirus disrupted people's pace of life to welcome the New Year. Pneumonia caused by the SARS-CoV-2 novel coronavirus is highly contagious and has a long latent period, making it difficult to be detected. It can spread through close droplets and physical contact. As it is a new type of virus, people still lack sufficient knowledge of it and treatment experience.

Therefore, with the large number of infections and the large number of infected people, people are extremely panicked and uneasy. Among them, asymptomatic infections, although without specific clinical symptoms, it cannot be ruled out that the viruses they carry are still highly contagious, and if they are not prevented and controlled in time, they can develop into patients or hidden sources of infection, jeopardizing the society. Therefore, to identify, isolate, treat and study asymptomatic novel coronavirus infections as soon as possible should be the focus of pandemic prevention and control. We are now collecting clinical cases to further understand the epidemiological characteristics of asymptomatic novel coronavirus infections, aiming to serve as a reference for epidemic prevention and control.

1 Data Sources and Methods

1.1 Basic Data

According to the National Health Commission "Diagnosis and Treatment Protocol for Novel Coronavirus Pneumonia (Trial Version 5)"[1], asymptomatic cases of SARS-CoV-2 novel coronavirus infection were selected as the research subjects. The research subjects had no clinical symptoms, such as cough, fever, fatigue and other subjective symptoms. They all had a history of close contact or were discovered during physical examinations, including the following: (1) After 14 days of quarantine and medical observation, there was no self-perceivable or clinically identifiable symptoms and signs; (2) During the latent period of "asymptomatic infection".

1.2 Collection of Asymptomatic Infection Cases

Search for cases of asymptomatic infection by tracking and investigating confirmed cases and close contacts (refers to all people who may have close contact with confirmed cases or suspected infected persons within a certain range of activities, including family members, relatives, friends, classmates, medical staff and service personnel, etc[2]). Diagnosis criteria: There were no relevant clinical manifestations, such as sore throat, cough, fever and other symptoms and signs that can be self-perceived or clinically recognized, but the respiratory tract and other specimens were tested positive with pathological SARS-CoV-2 novel coronavirus detection, or tested positive for serum specific antibody IgM (it is definitive if any one of the criteria was met).

1.3 Investigation Methods

Demographic data and epidemiological data, etc. of the cases were collected, and sampling and testing were conducted. (1) Pharyngeal swab: 2 Swabs with polypropylene fiber heads were used to collect pharyngeal swab specimens, the swabs were inserted and the sterile swab rod near the proximal part was broken off, and the tube cap was tightened and sealed with sealing film. (2) Antibody detection: colloidal gold method was used for detection, completed within 15 minutes. (3) Others: such as white blood cell count, lymphocyte count, alanine aminotransferase, aspartate aminotransferase, D-dimer, urea nitrogen, creatinine, procalcitonin, high-sensitivity C-reactive protein and creatine kinase.

1.4 Statistics

The epidemiological data of asymptomatic infections were analyzed by descriptive analysis method, and SPSS 25.0 statistical software was used for data processing and recording.

2 Results

2.1 General Data Results

A total of 10 cases of asymptomatic infection were collected. Among them, there were 6 males and 4 females. The youngest was 23 years old and the oldest was 67 years old, with an average age of (34.3±2.1) years.

Among the 10 cases of asymptomatic infection, 2 cases have a history of living in Hubei, and 8 cases have a history of close contact with confirmed cases.

The time of onset. In 6 out of the 10 cases of asymptomatic infection, the time of residence or time of contact with confirmed cases can be clearly determined. The time from contact to hospital admission was 3 to 43 days, with an average of (23.1±2.3) days.

Underlying diseases. 6 cases did not have other underlying diseases, and the other 4 cases had one or more underlying diseases, including 2 cases of hypertension, 1 case of anemia, and 1 case of fatty liver.

6 cases were diagnosed as asymptomatic infection from positive serum-specific IgM antibody test; 4 cases were diagnosed as asymptomatic infection from

positive throat swab test.

2.2 Clinical Manifestations

None of the 10 asymptomatic infections showed obvious symptoms such as cough and fever, and their body temperature did not exceed 37.3 ℃ .

2.3 Laboratory Indicators

Among the 10 cases of asymptomatic infection, 1 case (10.0%) had white blood cell count lower than the normal value, with a count value of (4.8±0.6) × 10^9/L; 1 case had lymphocyte count higher than the normal range (10.0%) ; D-dimer was out of the normal range in 3 cases (30.0%), where the average data value was (0.9±0.3) μg/L; the high-sensitivity C-reactive protein level was out of the normal range in 1 case (10.0%), the data value was (2.3±0.6) mg/L; 2 cases (20.0%) with creatine kinase level exceeding the normal range; 4 cases (40.0%) with alanine base transferase level higher than the normal range, the data value was (27.1±1.5) U/L; 2 cases (20.0%) with aspartate aminotransferase level higher than the normal range, the data value was (21.3±1.4) U/L. In addition, the creatinine levels of all 10 cases of asymptomatic infection were within the normal range, with an average of (66.3±5.2) μmol/L.

2.4 Pharyngeal Swab Test Results

9 cases of asymptomatic infections tested positive in the novel coronavirus nucleic acid test on the first pharyngeal swab specimens collected; 1 case was tested positive for a single target in the novel coronavirus nucleic acid test, and pharyngeal swab specimens were collected after 2 days, and was positive in the novel coronavirus nucleic acid test; the time taken for the 10 cases of asymptomatic infection in this group to turn negative from positive in the pharyngeal swab novel coronavirus nucleic acid test was 4-16 days, with an average of (8.3±1.2) days. As of April, the above 10 cases of asymptomatic infections have been tested negative in the novel coronavirus nucleic acid test with retested pharyngeal swab specimens.

2.5 Antibody Test Results

The 6 asymptomatic infections diagnosed by the detection of serum-specific IgM antibodies were re-examined one week later, of which 2 were still tested positive and 4 turned negative. Among the 4 cases of negative serum-specific IgM antibodies, 2 cases were tested positive for serum-specific IgG antibodies and the other 2 were tested negative. In these 6 cases, all were tested negative in the second nucleic acid test during the reexamination, and were discharged from quarantine subsequently.

3 Discussions

COVID-19 is characterized by different latent periods, strong infectivity, and the lack of specific clinical symptoms. In addition to the initial onset of the disease, there is a lack of clinical diagnosis and treatment experience. Therefore, once infected, some of the disease progresses quickly, and it is easy to develop breathing difficulties, hypoxemia, septic shock, difficulty correcting metabolic acidosis and coagulopathy, etc.[3], and the mortality rate is high. Since the outbreak of the pandemic, it has received global attention. It is worth noting that as the main source of transmission, asymptomatic infections have insidious characteristics, which brings great difficulties to epidemiological investigations and tracing of earliest infections and close contacts. Therefore, this type of group is also the key populations that cause the large-scale propagation of the virus[4].

The 10 cases of asymptomatic infection in this study were analyzed for their epidemiological characteristics: white blood cell counts were mostly normal, with only 1 abnormal case; lymphocyte counts were mostly low, with only 1 case higher than the normal range; the level of high-sensitivity C-reactive protein was mostly normal, with only 1 case out of the normal range, and the creatinine level in all cases was within the normal range. For the creatine kinase indicator value, 2 cases were out of the normal range, for the D-dimer indicator, 3 cases were out of the normal range, and for alanine transferase level, 4 cases were out of the normal range . According to the above statistics, among the laboratory indicators of asymptomatic infections, D-dimer, creatine kinase, and alanine transferase may be affected to some extent. Analysis of the causes of liver damage may be the following points: (1) After being infected with the novel coronavirus, it will stimulate the activation of human immune cells, which in turn leads to excessive accumulation of immune cells and the release of large amounts of inflammatory cytokines, causing a cytokine storm;

(2) Studies have suggested that the novel coronavirus receptor angiotensin-converting enzyme 2 is lowly expressed in hepatocytes, but is highly expressed in bile duct cells. Therefore, when bile duct cells are damaged, it will cause liver damage[5]; (3) For the drug treatment of patients with COVID-19, pharmacological liver injury is also an influencing factor of abnormal liver function[6]; (4) Affected by underlying diseases. Therefore, the above indicators can be used as the basis for judging the severity of COVID-19, and as reference indicators for clinical diagnosis, treatment and prognosis.

In this study, 2 cases had a history of living in Hubei, and 8 cases had a history of close contact with confirmed cases. The time from contact to hospital admission was 3~43 days, with an average of 23.1±2.3 days. As there was no self-perceivable or clinically identifiable symptoms and signs, asymptomatic infections are easily overlooked, which makes their infectiousness more insidious. In this group of 10 cases of asymptomatic infection, the pharyngeal swab novel coronavirus nucleic acid test turned from positive to negative in 4-16 days, with an average of 8.3±1.2 days. Although the negative-turning time may not be accurate enough, it can still be used as a reference for asymptomatic infection data.

Based on the above analyses, the asymptomatic SARS-CoV-2 novel coronavirus infection has certain clinical characteristics, which are infectious and insidious. Even if medical observation is dismissed, monitoring is still required to prevent the pandemic from rebounding.

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