Journal of Translational Medicine

LETTER TO THE EDITOR

Open Access

SARS-CoV-2 Omicron infection, who will be developed into severe/critical diseases?

Mudan Feng[1], Qing Lin[2] and Jian Xu[1,3*]

Dear editor,

Although the coronavirus disease 2019 (COVID-19) pandemic has now entered an endemic phase [1], local epidemics still have an important impact on people's lives and health. Recently, the COVID-19 epidemic has been on the rise in China. It is extremely meaningful to analyze and summarize the lessons learned from previous waves of the COVID-19 pandemic, which can provide references for nowadays and the future epidemic.

After infection with SARS-CoV-2, the cross-reactivity between virus and host may lead to different clinical outcomes including asymptomatic, mild, moderate, severe, and critical illness [2]. A total of 6228 patients infected with SARS-CoV-2 Omicron were hospitalized between November 12, 2022, and December 11, 2022. Among of them, 95.09% (5922/6228) patients had mild/moderate illness, while 3.03% (189/6228) patients had severe/critical illness. 117 (1.88%) patients with chronic kidney disease (CKD) were in a severe/critical condition due to the aggravation of the disease by SARS-CoV-2 Omicron infection (Fig. 1). The proportion of severe/critical patients was significantly lower than previously reported for SARS-CoV-2 wild-type strains [3].

Severe/critical patients consume more medical resources and face greater threats to their lives and safety. Therefore, severe/critical patients are the key group to which attention should be paid in the future. We evaluated the average age of severe/critical patients and found their average age to be significantly higher than that of the mild/moderate group (64.69 ± 17.76 years vs. 48.24 ± 24.05 years, $p < 0.01$), suggesting that more attention should be given to aged patients, especially those over 65 years old, who are at greater risk of developing severe/critical disease.

We analyzed the pre-existing diseases of 189 severe/critical patients and found that the proportion of severe/critical patients with pre-existing cardiovascular diseases (CD), respiratory diseases (RD), metabolic diseases (MD), gastrointestinal and hepatobiliary diseases (GHD), tumor diseases (TD), urinary diseases (UD), nervous system diseases (ND), infectious diseases (ID), osteoarthritis diseases (OD), and sense organ diseases (SOD) was 50.26%, 46.03%, 46.03%, 26.98%, 23.81%, 23.28%, 20.11%, 15.87%, 4.23%, and 2.65%, respectively, significantly higher than the corresponding proportions of mild/moderate patients ($p < 0.01$); however, although the proportion of severe/critical patients with pre-existing connective tissue diseases (CTD) and skin diseases (SD) was slightly higher than that of mild/moderate patients, the difference was not statistically significant ($p > 0.05$) (Fig. 2). The cardiovascular system may be the main target of

*Correspondence:
Jian Xu
1106134514@qq.com
[1] Department of Infectious Diseases, Affiliated Hospital of North Sichuan Medical College, Nanchong 637000, China
[2] Department of Infectious Diseases, The people's hospital of Jiulongpo district, Chongqing 400050, China
[3] Department of Infectious Diseases, The People's Hospital of Yubei District of Chongqing City, No. 23, North of Central Park, Yubei District, Chongqing 401120, China

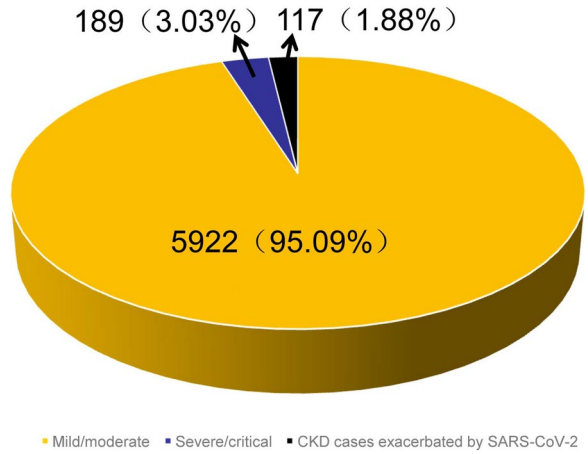

Fig. 1 Distribution of disease severity of SARS-CoV-2Omicron infection

SARS-CoV-2, and CD (mainly including heart failure, arrhythmia, congenital heart disease, rheumatic heart disease, hypertension, coronary atherosclerotic heart disease, valvular heart disease, cardiomyopathy, and pericardial disease) were the most common diseases in all phases of COVID-19 infection. SARS-CoV-2 infection and the host's immune response may play key roles in disease progression, and SARS-CoV-2 infection is capable of inducing endothelial inflammation in various organs. A total of 46.03% patients had RD (mainly including pulmonary infection, bronchiectasis, COPD, bronchial asthma, pulmonary hypertension, interstitial lung disease, and respiratory failure) and MD (mainly diabetes, thyroid dysfunction, metabolic syndrome, osteoporosis, and electrolyte disorders). This may be because the body is already in an inflammatory state in these patients. Inflammatory biomarkers including IL-6, C-reactive protein, D-dimer, ferritin, and procalcitonin are elevated in patients with severe/critical SARS-CoV-2 infection [4]. Therefore, we have put forth the concept of "bi-anti" for the early stage of SARS-CoV-2 infection [5], which is of practical significance for patients with the above mentioned underlying diseases. "Bi-anti" therapy may prevent a large number of patients from being hospitalized and thus save limited medical resources. Our findings suggest that a detailed understanding of a SARS-CoV-2 patient's pre-existing diseases is critical for determining the likelihood of a patient progressing to severe/critical disease.

Overall, COVID-19 is assumed to be a systemic disease, with more than one organ involved in disease progression. Pre-existing diseases can further promote the progression of SARS-CoV-2 infection and lead to severe/critical outcomes. Patients with pre-existing CD, RD, and MD comprise the main population that develops severe/critical disease after SARS-CoV-2 Omicron infection. Therefore, it is necessary to pay special attention to disease prevention and control in these high-risk populations.

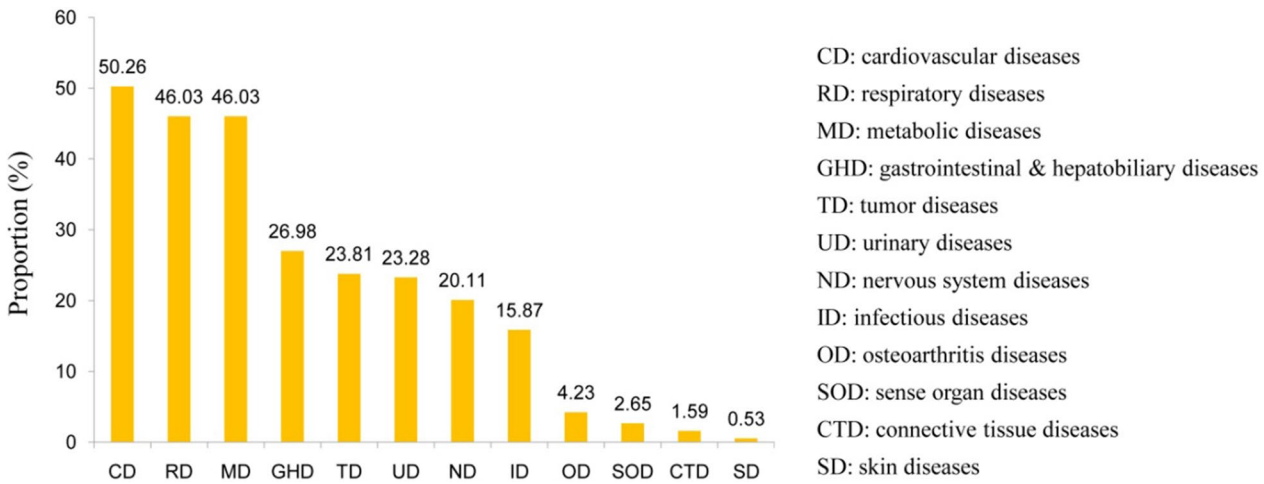

Fig. 2 Pre-existing comorbidities in severe/criticalpatients with SARS-CoV-2 Omicron infection

Acknowledgements
The authors express their thanks to the "American Journal Experts"for their assistance in modifying the language in this manuscript.

Author contributions
JX contributed to the conception of the thread. MF collected the data and drafted the manuscript. QL analyzed statistically the data. All authors read and approved the final manuscript.

Funding
This study was supported by the Health Commission of Jiulongpo District of Chongqing (Grant number 2019-020008-T).

Availability of data and materials
The original data in this study can be obtained from the corresponding author upon reasonable request.

Declarations

Ethics approval and consent to participate
The study was approved by the Clinical Research Ethics Committee of the People's Hospital of Yubei District of Chongqing City (Chongqing, China). Appropriate informed consent was obtained from patients or their legal surrogates before data collection.

Consent for publication
All authors approved the final version of the manuscript and consent for publication.

Competing interests
All authors have no financial or personal relationships with people or organizations mentioned in the manuscript.

Received: 9 May 2023 Accepted: 15 May 2023
Published online: 20 May 2023

References

1. Rubin EJ, Baden LR, Morrissey S. Audio interview Covid-19 as an endemic disease. N Engl J Med. 2022;10(6):21. https://doi.org/10.1056/NEJMe2201982.
2. Tian D, Sun Y, Xu H, Ye Q. The emergence and epidemic characteristics of the highly mutated SARS-CoV-2 Omicron variant. J Med Virol. 2022;94(6):2376–83.
3. Wu Z, McGoogan JM. Characteristics of and important lessons from the Coronavirus disease 2019 (COVID-19) outbreak in China: summary of a report of 72 314 cases from the Chinese center for disease control and prevention. JAMA. 2020;323(13):1239–42.
4. Yang X, Yu Y, Xu J, Shu H, Xia J, Liu H, et al. Clinical course and outcomes of critically ill patients with SARS-CoV-2 pneumonia in Wuhan, China: a single-centered, retrospective, observational study. Lancet Respir Med. 2020;8(5):475–81.
5. Xu J. Bi-anti therapy for SARS-CoV-2 infection among mild/moderate patients to prevent coronavirus disease 2019 from progressing to severe disease. J Transl Med. 2023;21(1):87. https://doi.org/10.1186/s12967-023-03965-3.

Publisher's Note