

Clinical Characteristics Analysis of Hospitalized Patients Infected with the Omicron Variant of the Novel Coronavirus

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Abstract: Objective: It's to analyze the clinical characteristics of hospitalized patients infected with the Omicron variant of the novel coronavirus. Methods: This study retrospectively analyzed the clinical data of 374 Omicron-infected patients admitted to The Third People's Hospital of Wuhu City from January 1, 2022, to December 31, 2022. Clinical characteristics were analyzed. Results: The mean time to nucleic acid conversion was 10.93 ± 3.55 days, with a median of 10 days. There was no statistically significant difference in the infection rate between females and males ($P > 0.05$). The highest proportion of patients was in the age group of 0-44 years ($P < 0.05$). Among patients, those without underlying diseases were more prevalent ($P < 0.05$). The majority of patients had no symptoms or mild symptoms ($P < 0.05$). Regarding vaccination status, most patients had completed the primary immunization or booster immunization ($P < 0.05$). The main symptoms were fever and respiratory symptoms ($P < 0.05$). In laboratory tests, some patients showed a decrease in lymphocyte count (31.82%), elevated C-reactive protein (21.93%), elevated alanine transaminase (18.18%), and elevated creatine kinase (12.30%). Most patients had no lesions on chest CT scans ($P < 0.05$). Traditional Chinese medicine was the primary treatment used ($P < 0.05$). The recovery rate was 100.00%. Conclusion: During this epidemic, the nucleic acid conversion for infected patients occurred around 10 days. Female patients had a higher infection rate, and the majority of cases were asymptomatic or mild. Most patients had completed either primary or booster immunization, indicating some resistance of the Omicron variant to vaccines. The main symptoms were fever and respiratory symptoms, and patients had significantly elevated white blood cell counts, neutrophil counts, and lymphocyte counts, indicating significant infection symptoms. Traditional Chinese medicine was the primary treatment used, and the recovery rate was 100.00%, suggesting that treatment with Traditional Chinese medicine was effective for the Omicron variant.

Keywords: novel coronavirus, omicron variant, hospitalized patients, clinical characteristics

1. Introduction

Novel Coronavirus Pneumonia, abbreviated as COVID-19, is an acute respiratory infectious disease. China has consistently placed a high priority on epidemic prevention and control, with widespread dissemination of COVID-19 vaccines. However, due to the continuous emergence of viral variants, especially the Omicron variant discovered in November 2021, it is more transmissible compared to the original strain and other variants [1]. In early 2022, the Omicron variant spread extensively in several provinces in China, posing an unprecedented challenge to domestic epidemic prevention and control efforts. Additionally, inadequate understanding of the characteristics of patients infected with the Omicron variant has increased the short-term medical treatment pressure [2]. Therefore, the purpose of this study is to analyze the clinical characteristics of hospitalized patients infected with the novel coronavirus Omicron variant, as detailed below.

2. Materials and Methods

2.1 General Materials

A total of 374 Omicron-infected patients treated at The Third People's Hospital of Wuhu City from January 1, 2022, to December 31, 2022, were included in this study. Among them, there were 184 males and 190 females, with an age range of 0.6 to 94 years, and a mean age of (47.33 ± 3.21) years. Inclusion Criteria: Patients who met the diagnostic criteria for Omicron variant infection through whole-genome sequencing and sequence analysis [3], including asymptomatic infection or initial infection with mild or moderate clinical classification, complete clinical data, and informed consent for participation in this study. Exclusion Criteria: Patients diagnosed but not admitted to the hospital, those confirmed to have severe COVID-19 requiring ICU treatment.

2.2 Methods

Patient data were collected, including days to nucleic acid conversion, gender, age, comorbidities, clinical classification, vaccination status, major symptoms, laboratory indicators, medication use, and prognosis. Laboratory indicators included white blood cell count, neutrophil count, lymphocyte count, ALT, AST, CK, LDH, Cr, BUN, CRP, PCT, and DD.

2.3 Statistical Analysis

Data were analyzed using SPSS 25.0 software. Quantitative data were expressed as " $\bar{x} \pm s$ " or median, and categorical data were presented as "n (%)." The chi-squared χ^2 test was used for statistical analysis. A p-value (P) less than 0.05 indicated statistically significant differences.

3. Results

3.1 Days to Nucleic Acid Conversion, Gender, Age, Comorbidities, and Clinical Classification

Among the 374 patients, the duration for nucleic acid conversion ranged from 5 to 28 days, with a mean $\pm$ standard deviation of 10.93 ± 3.55 days and a median of 10 days. There were 197 cases (52.67%) with nucleic acid conversion ≤ 10 days and 176 cases (47.06%) with conversion > 10 days ($P > 0.05$). Among the 374 patients, there were 184 males (49.20%) and 190 females (50.80%) ($P > 0.05$). In terms of age distribution, there were 234 patients (62.57%) aged 0-44 years, 93 patients (24.87%) aged 45-49 years, and 47 patients (12.57%) aged ≥ 60 years ($P < 0.05$). Regarding comorbidities, 76 patients (20.32%) had underlying diseases, while 298 patients (79.68%) did not have underlying diseases ($P < 0.05$). In terms of clinical classification, among the 374 patients, 185 (49.47%) were asymptomatic, 159 (42.51%) had mild symptoms, and 30 (8.02%) had moderate symptoms ($P > 0.05$).

3.2 Vaccination Distribution

According to the National Vaccine Administration Technical Guidelines [3], in this study, there were 37 patients (9.89%) who had not completed the primary immunization, 215 patients (57.49%) who had completed the primary immunization, and 122 patients (32.62%) who had completed the booster immunization. Among them, there were 30 patients who had not received any vaccine, 7 patients who had received one dose, 135 patients who had received two doses, 202 patients who had received three doses, and 1 patient who had received four doses ($P < 0.05$). Additionally, based on correlation analysis, age and the number of underlying comorbidities were negatively correlated with the number of vaccine doses, indicating that the vaccine uptake decreased with increasing age and the number of underlying comorbidities. See Table 1.

Table 1. Correlation Analysis between Vaccine Administration and Age, Number of Underlying Comorbidities

Vaccine Doses	r-Value	P-Value
Age	-0.71	< 0.01
Comorbidities	-0.58	< 0.01

3.3 Symptom Distribution

The distribution of symptoms was as follows: 200 patients (53.48%) were asymptomatic, 52 patients (13.90%) had a fever, 69 patients (18.45%) had respiratory symptoms, 5 patients (1.34%) had non-respiratory symptoms, 11 patients (2.94%) had both fever and respiratory symptoms, 12 patients (3.21%) had both fever and non-respiratory symptoms, 22 patients (5.88%) had both respiratory and non-respiratory symptoms, and 13 patients (3.48%) had fever, respiratory symptoms, and non-respiratory symptoms ($P < 0.05$).

3.4 Distribution of Laboratory Indicators

Refer to Table 2. Some patients exhibited a decrease in lymphocyte count (31.82%), elevated C-reactive protein levels (21.93%), elevated alanine transaminase (18.18%), and elevated creatine kinase (12.30%). In chest CT scan results, most patients did not have any lesions ($P < 0.05$).

Table 2. Distribution of Laboratory Indicators [n/%]

Indicator	Number of Cases (n)	Percentage (%)
White Blood Cell Count ($\times 10^9/L$)		
< 4	66	17.65
4-10	297	79.41
> 10	11	2.94
Neutrophil Count ($\times 10^9/L$)		
< 2	39	10.43

Indicator	Number of Cases (n)	Percentage (%)
2-7	308	82.35
> 7	27	7.22
Lymphocyte Count (*10 ⁹ /L)		
< 0.8	119	31.82
0.8-4	248	66.31
> 4	11	2.94
ALT (U/L)		
≤35	307	82.09
> 35	68	18.18
AST (U/L)		
< 40	347	92.78
> 40	27	7.22
CK (U/L)		
≤140	328	87.70
> 140	46	12.30
LDH (U/L)		
≤220	332	88.77
> 220	42	11.23
Cr (μmol/L)		
< 35	10	2.67
35-90	342	91.44
> 90	22	5.88
BUN (mg/dl)		
≤8.3	365	97.59
> 8.3	9	2.41
CRP (mg/L)		
≤10	292	78.07
> 10	82	21.93
PCT (ng/ml)		
≤0.5	361	96.52
> 0.5	13	3.48
DD (mg/L)		
≤1	367	98.13
> 1	7	1.87
Chest CT Findings		
No Lesion	297	79.41
Unilateral Lesion	20	5.35
Bilateral Lesions Trilateral Lesions	10	2.67
	49	13.10

3.5 Medication Use and Prognosis

Medication Use, Patients who did not receive medication: 18 cases (4.31%); Patients who received antibiotic therapy: 3 cases (0.80%); Patients who received steroid therapy: 1 case (0.27%); Patients who received traditional Chinese medicine (TCM): 342 cases (91.44%); Patients who received small molecule drugs and steroids: 1 case (0.27%); Patients who received small molecule drugs and TCM: 1 case (0.27%); Patients who received antibiotic therapy and TCM: 5 cases (1.34%); Patients who received antibiotics, steroids, and TCM: 2 cases (0.53%); Patients who received small molecule drugs, antibiotics, steroids, and TCM: 1 case (0.27%); Traditional Chinese Medicine (TCM) Use: Patients who did not use TCM: 23 cases (6.15%); Patients who used TCM: 351 cases (93.85%); Prognosis: The recovery rate was 100.00%.

4. Discussion

The Omicron variant of the virus is known to have a high viral load in positive patients and is highly transmissible [4]. In line with this study, patients infected with the Omicron variant and admitted to the hospital exhibited a wide age range, indicating that the population is generally susceptible. Among these patients, those aged 0-44 years accounted for the highest proportion at 62.57%, consistent with previous research findings [5]. Fever and respiratory symptoms were the predominant clinical manifestations following infection with the Omicron variant, and patients did not exhibit significant clinical symptoms such as respiratory distress. Severe and critical cases resulting from the Omicron variant infection were rare during this epidemic [6]. In this study, 54.01% of patients had received three doses of the vaccine, yet they still

contracted the Omicron variant. Although current vaccines may offer inadequate protection against the Omicron variant, they still provide some level of protection [7]. Abnormal laboratory indicators included a decrease in lymphocyte count, which is consistent with what is observed in COVID-19 infections. Lymphocytes, a type of white blood cell, play an essential role in specific immune recognition processes in the body, contributing to immune responses against infections and tumors [8]. The clinical significance of lymphocyte count abnormalities may be related to viral or bacterial infections, as well as conditions like aplastic anemia. Elevated levels of C-reactive protein (CRP) indicate the presence of inflammation. CRP is a non-specific inflammatory marker produced by the liver in response to microbial invasion and plays a role in activating complement and modulating phagocytic cell function. Elevated alanine transaminase (ALT) levels may suggest liver injury, while elevated creatine kinase (CK) levels may suggest heart muscle damage. COVID-19 can potentially cause liver injury, including hepatocyte degeneration and focal necrosis, often accompanied by neutrophil infiltration, and it can affect multiple organs, including the liver, heart, and spleen. After COVID-19 infection, inappropriate use of medications may lead to drug-induced liver injury, especially considering the systemic inflammatory response and ischemia/hypoxia in this disease. The impact of COVID-19 on the liver includes hepatocyte degeneration, focal necrosis, neutrophil infiltration, and congestion in hepatic sinusoids. There may also be lymphocyte and monocyte infiltration and microthrombosis in the portal area [10]. For patients with mild or asymptomatic COVID-19, proper medication use generally does not result in significant liver damage.

In this current wave of the pandemic, the nucleic acid of infected patients generally turns negative in approximately 10 days. Moreover, the infection rate is higher among females. Most of the cases are either asymptomatic or mild, with the primary symptoms being fever and respiratory issues. Additionally, patients exhibit a decrease in lymphocyte count and elevated levels of C-reactive protein, alanine transaminase, and creatine kinase. Notably, the Omicron variant responds well to traditional Chinese medicine treatment.

Acknowledgments

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References

- [1] Luo, R., Liu, B., Li, Z., et al. (2023). Clinical Symptoms and RNA Clearance Time of Omicron Variant Infection in Mild Patients in Different Age Groups. *International Journal of Laboratory Medicine*, 44(15), 1895-1901.
- [2] Zhang, W., Fang, B., Sun, D., et al. (2023). Analysis of Traditional Chinese Medicine Syndrome Characteristics in 332 Cases of Local Omicron Variant Infection Patients in Shanghai. *Chinese Journal of Integrative Medicine*, 43(6), 664-667.
- [3] China CDC. (2020). Technical Guidelines for COVID-19 Vaccine Administration (Version 1) [EB/OL]. Available from https://www.chinacdc.cn/jkzt/crb/zl/szkb_11803/jszl_2275/202010/t20201009_218123.html
- [4] Zhou, X., Yan, J., Zhao, C., et al. (2023). Clinical Characteristics Analysis of 385 Hospitalized Patients with Positive Nucleic Acid Detection for Omicron Variant of Novel Coronavirus. *Clinical Pulmonary Medicine*, 28(5), 668-670+676.
- [5] Zhang, J., Min, Y., Zhang, J., et al. (2023). Characteristics of 88 Cases of Positive Nucleic Acid Re-Testing After Discharge in 637 Patients with Omicron Variant Infection in Suzhou. *Clinical Pulmonary Medicine*, 28(3), 340-344.
- [6] Shi, C., Cheng, J., Zhang, J., et al. (2022). Clinical Characteristics Analysis of 144 Patients with Omicron Variant of Novel Coronavirus at the Beginning of 2022 in Suzhou. *Journal of Anti-Infection Pharmacy*, 19(11), 1581-1586.
- [7] Zhang, Y., Li, X., Chen, F., et al. (2022). Clinical Characteristics Analysis of Patients Infected with Delta and Omicron Variants of Novel Coronavirus. *Journal of Emerging Infectious Diseases (Electronic Edition)*, 7(3), 22-26.
- [8] Zhang, Y., Xie, X., Yu, X., et al. (2022). Epidemiological Characteristics Analysis of Patients Infected with Omicron Variant of Novel Coronavirus in a Shelter Hospital in Shanghai. *Chinese Journal of Epidemiology*, 43(4), 311-315+341.
- [9] Feng, L., Wang, X., Li, L., et al. (2022). Clinical Characteristics Analysis of Imported Omicron Variant of Novel Coronavirus in Tianjin. *Tianjin Medical Journal*, 50(10), 1083-1087.
- [10] Liu, B., Wang, Z., Qi, X., et al. (2022). Characteristics Analysis of Elderly Patients Infected with Locally Acquired Omicron Variant During the Epidemic in Zhejiang Province. *Chinese Journal of Public Health*, 38(9), 1102-1107."