Acupuncture and Herbal Medicine

Short-term post-COVID-19 symptoms in 21,012 patients: a cross-sectional study

Lujia Cao[1,2,3], Xiaolei Wu[1,2,3], Chenyao Zhang[1,2,3], Chuanchi Wang[4], Wenliang Lyu[5], Li Liu[6], Wei Liu[7], Zhimin Yang[8,9], Yan Shi[10], Shuguang Yu[11], Candong Li[12], Ming Yang[13], Xing Yan[1,2,3], Xinyao Jin[1,2,3], Hui Wang[1,2,3], Wenke Zheng[1,2,3], Bo Pang[1,2,3], Wentai Pang[1,2,3], Jingqing Hu[4,*], Junhua Zhang[1,2,3,*]

[1]Key Laboratory of National Medical Products Administration: Evidence-Based Evaluation of Traditional Chinese Medicine, Tianjin, China; [2]Chinese Core Outcome Sets Research Center, Tianjin, China; [3]Evidence-Based Medicine Center, Tianjin University of Traditional Chinese Medicine, Tianjin, China; [4]Tianjin University of Traditional Chinese Medicine, Tianjin, China; [5]Institute of Epidemic Research, Hubei University of Chinese Medicine, Shijiazhuang, China; [6]Shaanxi University of Chinese Medicine, Xianyang 712046, China; [7]Shandong University of Traditional Chinese Medicine, Jinan, China; [8]State Key Laboratory of Dampness Syndrome of Chinese Medicine, guangdong, China; [9]The Second Affiliated Hospital of Guangzhou University of Chinese Medicine, Guangdong 510006, China; [10]Liaoning University of Traditional Chinese Medicine, Shenyang, China; [11]Chengdu University of Traditional Chinese Medicine, Chengdu, China; [12]Fujian University of Traditional Chinese Medicine, Fuzhou, China; [13]Jiangxi University of Chinese Medicine, Nanchang, China

Abstract

Objectives: This study aimed to clarify the short-term symptoms, duration, and influencing factors in people recovering from coronavirus disease 2019 (COVID-19) after China's dynamic zero-COVID-19 policy was implemented in December 2022.

Methods: We included data from a large-scale on-line survey conducted in China between January 14 and February 1, 2023. Participants were individuals of all ages. Chi-squared tests and multivariate logistic regression analyses were performed to identify factors associated with different symptoms.

Results: Overall, 21,012 patients from seven regions of China were included in this study (female: 71.22%). For most patients, the period from symptom onset to a negative nucleic acid test result was ≤10 days (72.33%). The distribution of symptoms varied at different times, with respiratory (1–4 weeks) and psychocardiology (5–8 weeks) symptoms being the most common. Multivariate analysis identified male sex, no comorbidity, and living in northeast and northwest China (compared with central China) as independent factors associated with a lower risk of symptoms, while age (41–60 years) was a possible risk factor (compared with 18–40 years).

Conclusions: Short-term respiratory and psychocardiology symptoms were the most common after COVID-19 recovery. Sex, age, geographical region, and comorbidities were potential influencing factors for the development of short-term symptoms.

Keywords: China, COVID-19, Influencing factors, Negative nucleic acid test, Short-term symptoms

Introduction

On March 11, 2020, the World Health Organization (WHO) declared coronavirus disease 2019 (COVID-19) a global pandemic[1]. COVID-19's mutations and high infectivity have serious health and economic implications. Since the COVID-19 outbreak until December 2022, China has adopted a blockade or dynamic zero-COVID policy to prevent and control the virus's spread[2–4]. On December 7, 2022, the Chinese government issued a new prevention policy and announced that the dynamic zero-COVID policy, which had been in place for approximately 3 years, would be officially adjusted[5]. Although many patients with COVID-19 are recovering as the pandemic is being controlled, they may later experience certain symptoms; the knowledge regarding COVID-19 and its sequelae remains limited, and the associated symptom profiles and evolutionary patterns are unclear[6].

According to domestic and international epidemiological surveys and clinical diagnosis data, many infected patients present with symptoms after nucleic acid/antigen conversion, called "post-COVID-19 syndrome," which affects their daily life and ability to work[7]. The Centers for Disease Control and Prevention (CDC)

Lujia Cao, Xiaolei Wu, Chenyao Zhang, and Chuanchi Wang contributed equally as co-first authors.

*Corresponding authors. Jingqing Hu, E-mail: gcp306@126.com; Junhua Zhang, E-mail: zjhtcm@foxmail.com.

How to cite this article: Cao LJ, Wu XL, Zhang CY, Wang CC, Lyu WL, Liu L, Liu W, Yang ZM, Shi Y, Yu SG, Li CD, Yang M, Yan X, Jin XY, Wang H, Zheng WK, Pang B, Pang WT, Hu JQ, Zhang JH. Short-term post-COVID-19 symptoms in 21,012 patients: a cross-sectional study. Acupunct Herb Med 2025;5(3):291–300. doi: 10.1097/HM9.0000000000000166

Received 29 December 2024 / Accepted 30 July 2025

defines "post-COVID conditions" as a wide range of physical and mental health consequences experienced by some patients, which occur ≥4 weeks after severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infection[8–9]. Many studies have focused on the long-term symptoms (post-COVID-19 sequelae)[7]; however, little attention has been paid to short-term symptoms after nucleic acid test-negative transition.

We speculated that the short term after the nucleic acid test-negative transition may be an important window. Therefore, we suggest that timely and precise interventions for early symptoms after recovery may facilitate further recovery and reduce the occurrence of long-term COVID-19 symptoms.

The present study aimed to clarify the characteristics and evolution of short-term symptoms of COVID-19, promote patients' recovery, and provide a basis for the prevention and treatment of long-term COVID-19 symptoms.

Materials and methods

Study design and participants

This nationwide, multicenter, cross-sectional study was conducted by the Xin-Huangpu Joint Innovation Institute of Chinese Medicine, comprising 10 domestic medical institutions, including Tianjin University of Traditional Chinese Medicine, Liaoning University of Traditional Chinese Medicine, Shandong University of Traditional Chinese Medicine, Chengdu University of Traditional Chinese Medicine, Shaanxi University of Chinese Medicine, Jiangxi University of Chinese Medicine, Hubei University of Chinese Medicine, Fujian University of Traditional Chinese Medicine, and the Second Affiliated Hospital of Guangzhou University of Chinese Medicine. This study followed the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) reporting guideline. The on-line survey was conducted between January 14 and February 1, 2023, to assess the symptoms of post-COVID-19 short-term conditions in Chinese patients. In this study, a nucleic acid test-negative transition was defined as recovery. Any newly occurring or pre-existing symptoms in patients with COVID-19 within 8 weeks of nucleic acid test-negative transition were defined as short-term symptoms.

Survey design

The on-line questionnaire was based on the relevant content of the "expert consensus on the diagnosis and clinical evaluation of traditional Chinese medicine for common symptoms of post-COVID-19 condition" and developed with reference to national and international literature[10]. We organized clinicians, statistical experts, epidemiological experts, and other relevant experts to design questionnaires and form "expert consensus on the diagnosis and clinical evaluation of traditional Chinese medicine for common symptoms of post-COVID-19 condition." Before the official launch of the questionnaire, we invited internal experts to conduct a pre-trial to assess any problems that may arise when filling out the questionnaire and make modifications[10]. The on-line questionnaire took about 3 minutes to complete. This study adopted the convenience sampling technique to get participants involved by using anonymous on-line questionnaires posted on an on-line and open-access survey platform, Questionnaire Star (https://www.wjx.cn/), and circulated using a social networking mobile application called WeChat.

Data on demographics (including sex, age, comorbidities, and whether they received the COVID-19 vaccine), medical history (including hospitalization, medication, and the time of nucleic acid transition to negative status), and clinical features of the post-COVID-19 short-term condition were collected. The symptoms were divided among five systems, including general, respiratory, gastrointestinal, psychocardiology, and other symptoms. Respiratory symptoms included coughing, white sputum, stuffy nose, shortness of breath, itchy throat, dry throat, yellow sputum, and dyspnea. General symptoms included fatigue, chills, myalgia, sweating during movement, heavy limbs, cold hands and feet, night sweats, arthralgia, low fever, and a feverish sensation in the palms and soles. Psychocardiology symptoms included early insomnia, palpitation, inattention, sleep disruption, dizziness, amnesia, chest tightness, increased heart rate, headache, anxiety, and vexation. Gastrointestinal symptoms included anorexia, diarrhea, abdominal distension, nausea, and vomiting. Other symptoms included taste disorders, dysosmia, dry eyes, alopecia, abnormal menstruation, xerosis cutis, tinnitus, vision loss, and hypoacusis.

Ethical consideration

Our study was in accordance with the ethical standards formulated in the Helsinki Declaration. The Ethics Committee at Tianjin University of Traditional Chinese Medicine provided institutional review board approval (approval number: TJUTCM-EC20230002). Informed consent was discussed as part of the introduction to the questionnaire; the introduction mentioned the survey objective, initiatives, content, confidentiality of information, and the time required to fill out the questionnaire. After acceptance of the above, patients could voluntarily answer and submit their questionnaires.

Statistical analysis

Demographic data and the prevalence of short-term symptoms were expressed as numbers and percentages. Categorical variables, including age, sex, regional distribution, and the presence of comorbidities, were compared between groups using a χ^2 test. Multivariate logistic regression analyses were performed to identify factors associated with each symptom. In the multivariate model, variables included age, sex, regional distribution, and the presence of comorbidities. The odds ratios (OR) and corresponding 95% confidence intervals (CI) for the association between potential influencing factors (including age, sex, regional distribution, and presence of comorbidities) and short-term symptoms were examined using logistic regression analysis. All statistical analyses in this study were two-tailed; $P < 0.05$ was considered

statistically significant, and all analyses were conducted using IBM SPSS Statistics 23.0.

Results

Participant characteristics

A total of 21,012 patients were included in this study, with most being female (71.22%). Patients of all age groups participated; most were 18 to 40 (80.47%) and 41 to 60 years old (15.26%). There were 18,871 (89.81%) patients with no comorbidities; of those remaining, 712 (3.39%), 409 (1.95%), and 287 (1.37%) patients had hypertension, hyperlipidemia, and diabetes, respectively. Table 1 shows further details of the patients involved in the survey.

Treatment and medication during the participants' infection period

Of the 21,012 patients, only 1,153 (5.49%) were hospitalized. Patients received various types of treatments and combined medications. Drug treatment was mainly antipyretic drugs (15,304, 72.83%), followed by traditional Chinese medicine (7,142, 33.99%), antiviral drugs (4,563, 21.72%), antibiotics (2,406, 11.45%), physical therapy (214, 1.02%), and diet therapy (184, 0.88%). Some patients did not clearly report the type of medication (395, 1.88%), and others did not undergo any treatment measures (1,259, 5.99%). Regarding the selection of traditional Chinese medicine dosage forms, 7,142 patients chose to use Chinese patent medicine (2,972, 41.96%), Chinese medicine decoction (2,733, 38.66%), or a combination of both (1,437, 19.38%).

Table 1

Demographic characteristics of the study participants (*n* [%])

Characteristic	Category	Frequency
Sex	Female	14,964 (71.22)
	Male	6,048 (28.78)
Age (years)	<18	389 (1.85)
	18–40	16,908 (80.47)
	41–60	3,206 (15.26)
	>60	509 (2.42)
Comorbidity	No comorbidity	18,871 (89.81)
	Hypertension	712 (3.39)
	Hyperlipidemia	409 (1.95)
	Diabetes	287 (1.37)
	Tumors	167 (0.79)
	Coronary heart disease	149 (0.71)
	Liver disease	139 (0.66)
	Chronic lung disease	109 (0.52)
	Kidney disease	84 (0.40)
	Stroke	40 (0.19)
	Others	768 (3.66)

For most patients, the period from symptom onset to a negative nucleic acid test was within 14 days (17,530, 83.43%). Among the patients tested, 15,199 (72.33%), 2,331 (11.09%), and 620 (2.95%) patients tested negative for nucleic acids within 10, 10–14, and ≥15 days, respectively, whereas 2,862 (13.62%) patients did not know when their nucleic acid test was negative.

Short-term post-COVID-19 condition

We investigated the related symptoms in each of the five systems (including general, respiratory, gastrointestinal, psychocardiology, and other symptoms).

Overall condition of short-term symptoms in the five systems

After recovering from COVID-19, most patients (20,351, 96.85%) experienced various short-term symptoms within 1 to 8 weeks, whereas 661 (3.15%) reported no symptoms. Respiratory symptoms were the most common (19,631, 93.43%), followed by general (18,204, 86.64%), psychocardiology (15,279, 72.71%), other (13,650, 64.96%), and gastrointestinal (12,502, 59.50%) symptoms.

Factors influencing short-term symptoms in the five systems

We performed statistical analysis of the potential factors influencing short-term symptoms. In the univariate analysis, sex, age, comorbidities, and regional distribution were all potential influencing factors associated with short-term symptoms ($P < 0.05$; Supplemental Table 1, https://links.lww.com/AHM/A183). In the multivariate analysis, male sex, having no comorbidity, and living in northeast and northwest China (compared with central China) were potential independent factors associated with less likelihood of having symptoms. Patients aged 41 to 60 years were more associated with increased short-term COVID-19 symptoms than those aged 18 to 40 years ($P < 0.05$; Figure 1).

Results of the multivariate analysis of respiratory symptoms

Figure 1A shows the results of the multivariate analysis of respiratory symptoms. Male sex (odds ratio [OR]: 0.481, 95% confidence interval [CI]: 0.410–0.563); having no comorbidity (OR: 0.350, 95% CI: 0.225–0.542); living in northeast China (OR: 0.713, 95% CI: 0.532–0.956) and northwest China (OR: 0.776, 95% CI: 0.617–0.976); and age <18 years (OR: 0.621, 95% CI: 0.395–0.976) were independent factors associated with being less likely to have short-term respiratory symptoms. Patients aged 41 to 60 years were more likely to be associated with increased respiratory symptoms of COVID-19 than those aged 18 to 40 years (OR: 1.517, 95% CI: 1.141–2.017).

Results of the multivariate analysis of general symptoms

Male sex (OR: 0.473, 95% CI: 0.404–0.554); having no comorbidity (OR: 0.341, 95% CI: 0.220–0.529); living in northeast China (OR: 0.713, 95%

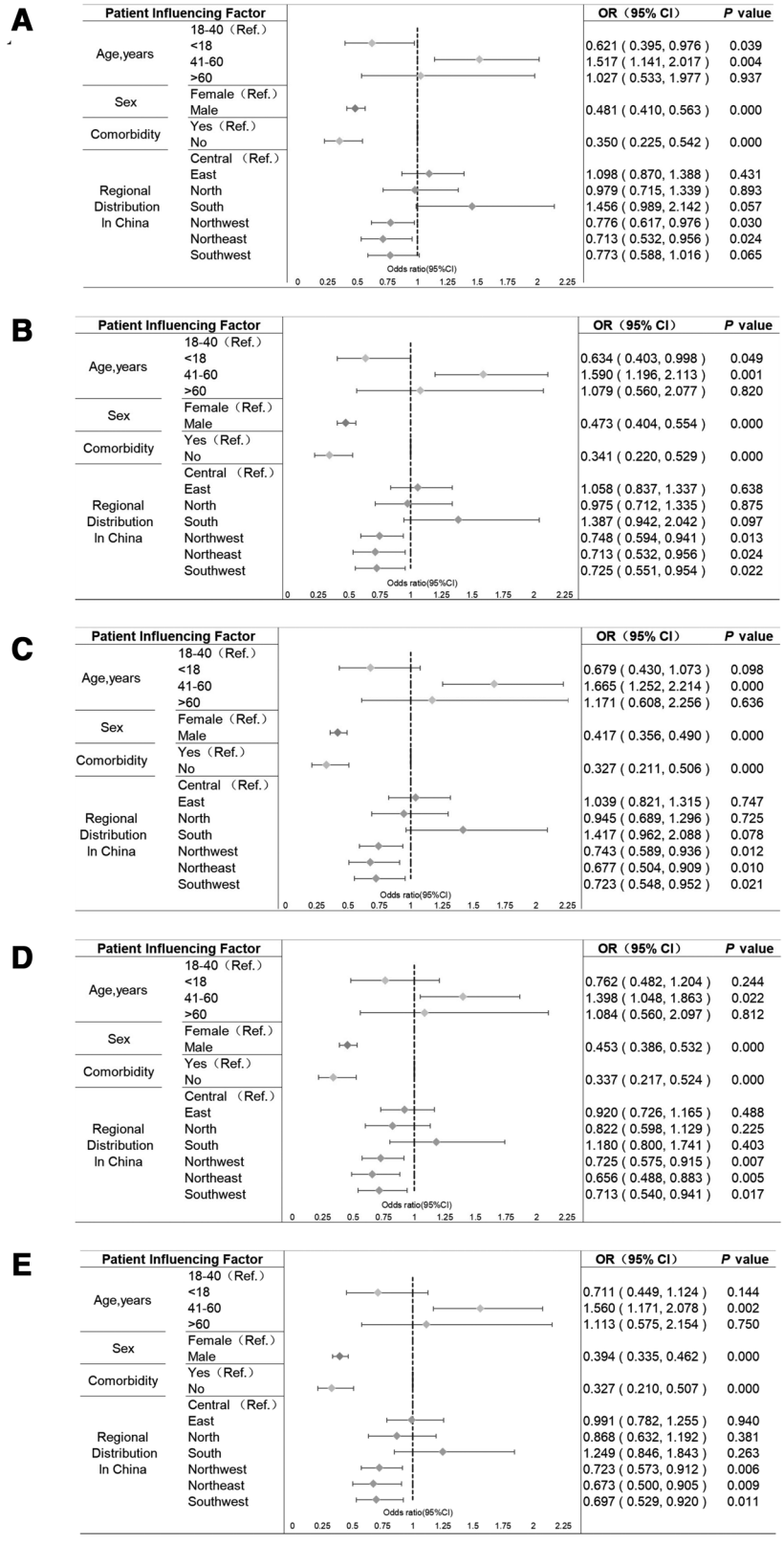

Figure 1. Factors influencing short-term symptoms in the five systems. (A) Forest plot of the OR of factors influencing respiratory symptoms. (B) Forest plot of the OR of factors influencing general symptoms. (C) Forest plot of the OR of factors influencing psychocardiology symptoms. (D) Forest plot of the OR of factors influencing gastrointestinal symptoms. (E) Forest plot of the OR of factors influencing other symptoms. CI: Confidence interval; OR: Odds ratio.

CI: 0.532–0.956), northwest China (OR: 0.748, 95% CI: 0.594–0.941), and southwest China (OR: 0.725, 95% CI: 0.551–0.954); and age <18 years (OR: 0.634, 95% CI: 0.403–0.998) were associated with a lower likelihood of having general symptoms. The odds of having short-term general symptoms were higher in participants aged 41 to 60 years (OR: 1.590, 95% CI: 1.196–2.113) (Figure 1B).

Results of the multivariate analysis of psychocardiology symptoms

For psychocardiology symptoms, male sex (OR: 0.417, 95% CI: 0.356–0.490); no comorbidity (OR: 0.327, 95% CI: 0.211–0.506); and living in northeast China (OR: 0.677, 95% CI: 0.504–0.909), northwest China (OR: 0.743, 95% CI: 0.589–0.936), and southwest China (OR: 0.723, 95% CI: 0.548–0.952) were associated with less likelihood of having short-term psychocardiology symptoms. Patients aged 41 to 60 years were more likely to have increased psychocardiology symptoms of COVID-19 than those aged 18 to 40 years (OR: 1.665, 95% CI: 1.252–2.214) (Figure 1C).

Results of the multivariate analysis of gastrointestinal symptoms

As shown in Figure 1D, the odds of having short-term gastrointestinal symptoms were lower in male patients (OR: 0.453, 95% CI: 0.386–0.532); those without comorbidities (OR: 0.337, 95% CI: 0.217–0.524); and those living in northeast China (OR: 0.656, 95% CI: 0.488–0.883), northwest China (OR: 0.725, 95% CI: 0.575–0.915), and southwest China (OR: 0.713, 95% CI: 0.540–0.941). Patients aged 41 to 60 years were more likely to have increased gastrointestinal symptoms of COVID-19 than those aged 18 to 40 years (OR: 1.398, 95% CI: 1.048–1.863).

Results of the multivariate analysis of other symptoms

For other symptoms, male sex (OR: 0.394, 95% CI: 0.335–0.462); having no comorbidity (OR: 0.327, 95% CI: 0.210–0.507); and living in northeast China (OR: 0.673, 95% CI: 0.500–0.905), northwest China (OR: 0.723, 95% CI: 0.573–0.912), and southwest China (OR: 0.697, 95% CI: 0.529–0.920) were independent factors associated with less likelihood of having other symptoms. The odds of having other symptoms were higher in participants aged 41 to 60 years than in those aged 18 to 40 years (OR: 1.560, 95% CI: 1.171–2.078) (Figure 1E).

Symptoms and the duration of their occurrence in the five systems

We collected data on the duration of the occurrence of symptoms in patients within 1 to 8 weeks after their nucleic acid transition to negative status, and the results showed that most symptoms disappeared after 1 to 2 weeks of recovery, whereas others lasted for 3 to 4 weeks or even 5 to 8 weeks. Furthermore, 19,195 (91.35%), 10,640 (50.64%), and 3,669 (17.46%) patients continued to experience a series of symptoms at 1 to 2, 3 to 4, and 5 to 8 weeks, respectively. The number of patients with various systemic symptoms decreased over time. Regarding the respiratory system, 15,461 (73.58%), 6,813 (32.42%), and 1,901 (9.05%) patients had symptoms lasting for 1 to 2, 3 to 4, and 5 to 8 weeks, respectively. The number of people with symptoms lasting for 1 to 2, 3 to 4, and 5 to 8 weeks was 15,482 (73.68%), 4,947 (23.54%), and 1,376 (6.55%), respectively, for general symptoms; 11,592 (55.17%), 5,210 (24.80%), and 1,974 (9.39%), respectively, for psychocardiology symptoms; 10,451 (49.74%), 4,159 (19.79%), and 1,557 (7.41%), respectively, for other symptoms; and 10,620 (50.54%), 2,092 (9.96%), and 569 (2.71%), respectively, for gastrointestinal symptoms (Figure 2A).

Respiratory symptoms

After recovery, the number of patients with respiratory symptoms was 19,631 (93.43%). The most common respiratory symptom was cough (15,373, 73.16%), followed by white sputum (6,635, 31.58%), stuffy nose (5,302, 25.23%), shortness of breath (4,622, 22.0%), itchy throat (4,517, 21.50%), dry throat (4,324, 20.58%), yellow sputum (3,903, 18.58%), and dyspnea (1,345, 6.40%). In contrast, 1,381 (6.57%) patients reported no respiratory symptoms (Figure 2B).

General symptoms

After recovering from COVID-19, only 2,808 (13.36%) patients reported no general symptoms, whereas most still presented with various symptoms (18,204, 86.64%). The most common symptoms were fatigue (14,609, 69.53%), chills (6,085, 28.96%), myalgia (3,745, 17.82%), sweating during movement (3,348, 15.93%), and heavy limbs (3,330, 15.85%). Figure 2C shows more detailed information on the general symptoms.

Psychocardiology symptoms

After the nucleic acid transition to negative status, 15,279 (72.72%) patients had psychocardiology symptoms, whereas 5,733 (27.28%) did not. The most common symptoms were early insomnia (4,299, 20.46%), palpitations (3,967, 18.88%), inattention (3,818, 18.17%), sleep disruption (3,802, 18.09%), dizziness (3,767, 17.93%), amnesia (3,762, 17.90%), and chest tightness (3,244, 15.44%) (Figure 2D).

Gastrointestinal symptoms

After recovery, some patients reported no gastrointestinal symptoms (8,510, 40.50%), whereas others had digestive system discomfort (12,502, 59.50%), anorexia (8,763, 41.70%), diarrhea (3,014, 14.34%), abdominal distension (2,263, 10.77%), or nausea and vomiting (1,593, 7.58%) (Figure 2E).

Other symptoms

Some patients had taste disorders (5,276, 25.11%), dysosmia (3,823, 18.19%), dry eyes (3,196, 15.21%), alopecia (2,810, 13.37%), menstrual abnormalities (2,746, 13.07%), and other symptoms (Figure 2F).

Prominent symptoms during different periods

Fatigue and cough were the most prominent symptoms at all time points during the 8 weeks of rehabilitation. In addition, after 1 to 2 weeks of rehabilitation, the patients experienced symptoms such as anorexia, white sputum, taste disorders, stuffy noses, and chills. After 3 to 4 weeks, the prominent symptoms were white sputum,

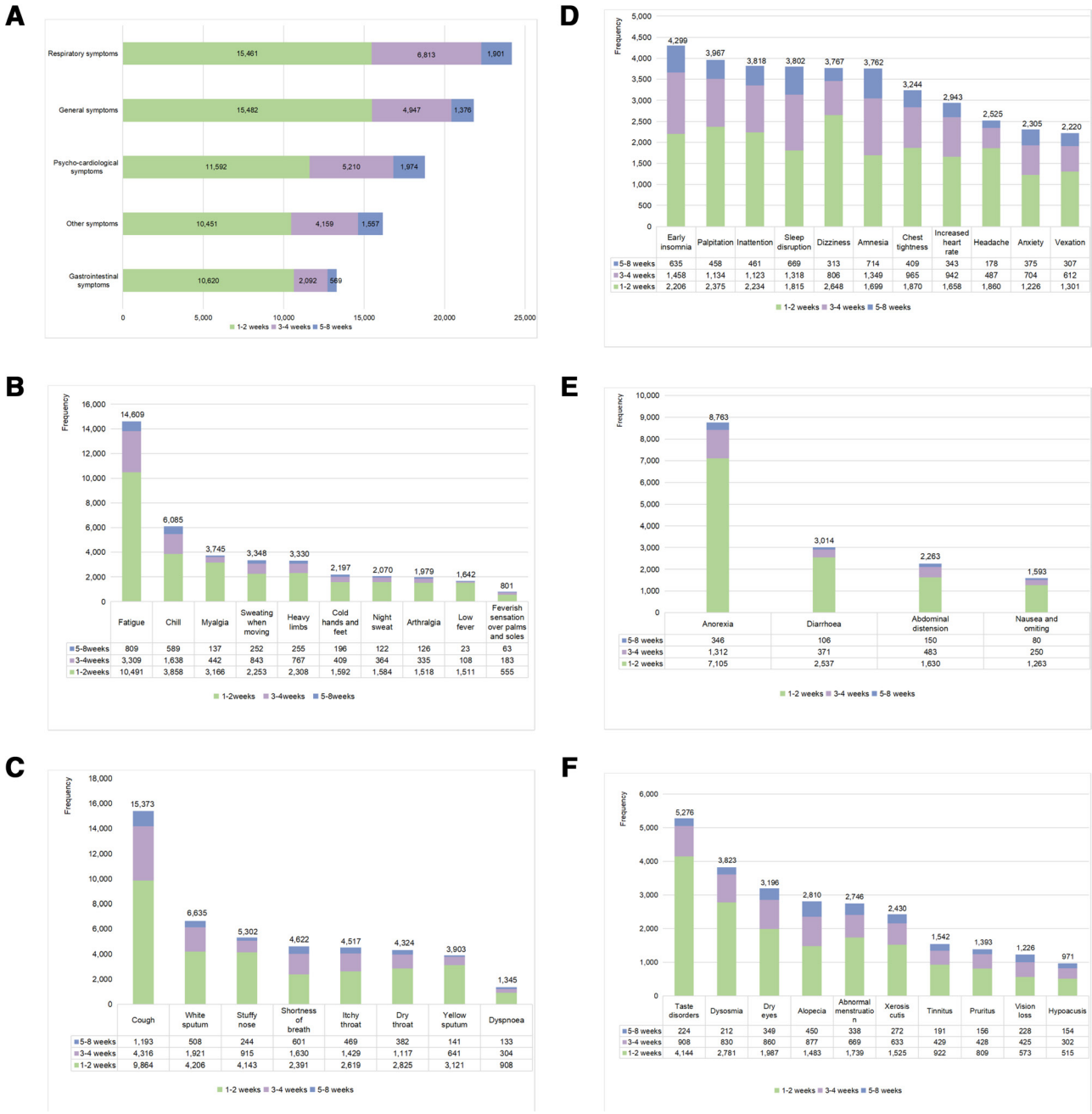

Figure 2. Symptoms and the duration of their occurrence in the five systems. (A) Number of people with symptoms in the five systems within different durations. (B) Respiratory symptoms and duration of the short-term post-COVID-19 condition. (C) General symptoms and duration of the short-term post-COVID-19 condition. (D) Psychocardiology symptoms and duration of the short-term post-COVID-19 condition. (E) Gastrointestinal symptoms and duration of the short-term post-COVID-19 condition. (F) Other symptoms and duration of the short-term post-COVID-19 condition. COVID-19: Coronavirus disease 2019.

chills, shortness of breath, early insomnia, and an itchy throat. After 5 to 8 weeks, prominent symptoms included amnesia, sleep disruption, early insomnia, shortness of breath, and chills. We observed that the number of people with short-term symptoms decreased over time. Figure 3 shows the 15 most common symptoms during the different periods.

Regional distribution of the participants

The 21,012 patients from 31 provinces were divided into seven regions according to geographical location: Central (6,589,31.36%), East (4,136,19.68%), Northwest (3,195,15.21%), Southwest (1,861,8.86%), North (1,807,8.60%), South (1,815,8.64%), and Northeast (1,609,7.66%) China. Table 2 shows the provinces included in the different regions and the number of participants in each province.

Discussion

This study aimed to clarify the short-term symptoms, duration, and potential influencing factors in people recovering from COVID-19 after the implementation of China's dynamic zero-COVID-19 policy on December 7, 2022. We clarified the current status of Chinese patients with COVID-19 based on 21,012 responses collected through an on-line survey.

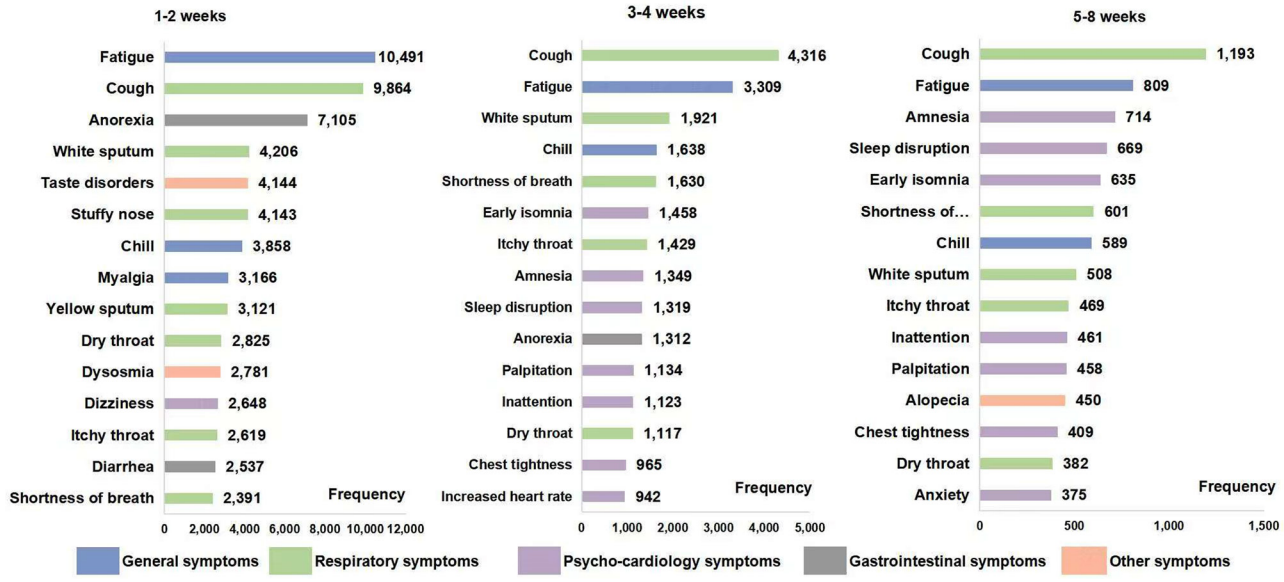

Figure 3. Prominent symptoms of the short-term post-COVID-19 condition. COVID-19: Coronavirus disease 2019.

COVID-19 nucleic acid transition time

According to the results of our study, 72.33% of the patients' nucleic acid test results were negative within 10 days, shorter than the duration reported by other studies. An Indian study showed that the proportion of patients whose COVID-19 real-time reverse-transcription polymerase chain reaction test (RT-PCR) was negative within 14 days was 60%, an Ethiopian study found that the median duration of virus clearance in patients with COVID-19 was 19 days, and an Israeli study of 5,769 patients with COVID-19 reported an average recovery time of 13.239 to 14.814 days[11–13]. Studies in Singapore have shown that the average recovery time of patients infected with COVID-19 is 12 days[14]. Among 116 asymptomatic patients with COVID-19 in a study in the United States, 81 (69.8%) had negative nasopharyngeal swabs after 14 days[15].

The shortened duration noted in our study may be due to a series of factors. First, there are hundreds of mutant strains of SARS-CoV-2[16]. The prevalent SARS-CoV-2 strains in China were BA.5.2 and BF.7, the sub-branches of Omicron mutant BA.5[17]. The Omicron strain has enhanced transmission speed and higher infectivity and induces lower viral risk than other strains; this strain is characterized by lower hospitalization, severe case incidence, and mortality rates[18–20]. Compared with the Delta variant, the risks of hospitalization and death caused by the Omicron variant were reduced by 59% and 69%, respectively[21]. Second, we also considered differences in treatment methods. In the present study, 33.99% of the patients were treated with traditional Chinese medicine, and the duration of the nucleic acid transition to negative of the majority of these patients was within 10 days. Traditional Chinese medicine is a unique health resource in China. Studies have shown that using traditional Chinese medicine or a combination of Chinese and Western medicine to treat COVID-19 can significantly shorten the time of nucleic acid test transition (recovery)[22–29]. We will further analyze the influence of medication and other factors in subsequent research.

Duration and characteristics of short-term post-COVID-19 symptoms

Among patients recovering from COVID-19, some exhibit persistent symptoms that last for weeks, months, or longer. After recovery, these symptoms become an emerging public health problem requiring attention[30]. Due to the short interval between our on-line survey and the COVID-19 outbreak in China, most of the persistent symptoms reported by patients after recovery in this study were short-term symptoms[30]. The present study's results showed that 661 (3.15%) of the 21,012 patients reported no symptoms after recovery, whereas others displayed various symptoms over different durations.

Overall picture of short-term symptoms in the five systems

According to the overall profile of persistent symptoms after recovery (regardless of the period), most people experienced respiratory symptoms, with cough being the most common (73.16%); 18,204 patients experienced general symptoms (86.64%), with fatigue being the most common (69.53%); 15,279 patients experienced psychocardiology symptoms (72.71%), with difficulty in sleeping being the most common (4,300, 20.46%); 12,502 patients experienced gastrointestinal symptoms (59.50%), with loss of appetite being the most common (41.7%); and other patients experienced other symptoms, with taste disorders being the most common (25.11%).

Other studies have also reported short-term symptoms in patients after COVID-19 rehabilitation. According to previous reports, the most common symptoms in patients were fatigue, shortness of breath, and coughing[31]. After 35 days of rehabilitation, symptoms such as fatigue, myalgia, shortness of breath, and coughing were reported. The number of patients with symptoms after 35 days was lower than that at discharge[32]. A related survey in Italy found that 87.4% of the patients with COVID-19 still had symptoms 60

Table 2

Regional and provincial distribution of the study population (*n* [%])

Geographical region	Province
Central China	
Hubei	4,497 (21.40)
Henan	1,855 (8.83)
Hunan	237 (1.13)
East China	
Jiangsu	304 (1.45)
Zhejiang	257 (1.22)
Anhui	256 (1.22)
Shandong	1,832 (8.72)
Shanghai	114 (0.54)
Jiangxi	435 (2.07)
Fujian	938 (4.46)
North China	
Beijing	348 (1.66)
Tianjin	816 (3.88)
Hebei	272 (1.29)
Shanxi	266 (1.27)
Inner Mongolia	105 (0.50)
Northeast China	
Heilongjiang	126 (0.60)
Jilin	74 (0.35)
Liaoning	1,409 (6.71)
Northwest China	
Gansu	276 (1.31)
Shaanxi	2,569 (12.23)
Ningxia	53 (0.25)
Xinjiang	238 (1.13)
Qinghai	59 (0.28)
South China	
Guangdong	1,504 (7.16)
Guangxi	264 (1.26)
Hainan	47 (0.22)
Northwest China	
Sichuan	1,093 (5.20)
Chongqing	148 (0.70)
Guizhou	436 (2.08)
Yunnan	160 (0.76)
Tibet	24 (0.11)

days after discharge from the hospital, with fatigue, dyspnea, and joint pain being the most common symptoms[33]. A study in Wuhan, China, also confirmed that cough, dyspnea, and fatigue were commonly observed during the follow-up of patients with COVID-19 who underwent rehabilitation[34]. The results of these studies are partially similar to ours; however, there are some differences.

Changes in the short-term symptoms over time

The results of persistent symptoms at different periods showed that the number of patients with persistent symptoms decreased rapidly over time. The number of people with each symptom fluctuated over time. Fatigue and cough were the most common symptoms after 1 to 2 weeks of recovery, and the number of patients with these two symptoms remained prominent after 3 to 4 weeks and even after 5 to 8 weeks. The prevalence of other symptoms gradually decreased over time; for example, symptoms such as taste disorder, stuffy nose, myalgia, and dysosmia were prominent at 1 to 2 weeks but decreased at 3 to 4 weeks (the symptom ranking decreased to outside the top 15). Furthermore, the prevalence of symptoms associated with increased heart rate decreased at 3 to 4 weeks compared with 1 to 2 weeks; however, it ranked higher than that of other symptoms (symptom ranking increased to within the top 15). Symptoms associated with persistent alopecia and anxiety after 5 to 8 weeks were also more prominent than others, and this was also confirmed by a study in the United States[35].

Factors influencing short-term symptoms

Statistical analysis results suggest that sex, presence of comorbidities, age, and regional distribution influenced the development of short-term symptoms in patients with COVID-19 after recovery.

Sex

The research institution that conducted this study had more female employees, which resulted in more females answering the questionnaires. Data analysis revealed that fewer males than females presented with various symptoms after recovery, which may be associated with the degree of social activity and organismal immunity of the sexes. This suggests that attention should be paid to sex-related factors during disease prevention and treatment.

Comorbidities

A lower proportion of people without comorbidities experienced symptoms than those with comorbidities, with the top three comorbidities in the survey results being hypertension, hyperlipidemia, and diabetes. Hypertension is the most common risk factor for cardiovascular disease and can exacerbate the adverse effects of COVID-19 in the body[36–37]. Patients with diabetes are susceptible to COVID-19, and COVID-19 may contribute to new-onset diabetes in healthy individuals[38]. Hyperlipidemia is an important factor that influences sudden myocardial infarction and stroke. Studies have shown that the long-term risks of dyslipidemia and lipid-lowering drugs increase in patients recovering from COVID-19. The risk of hospitalization also increases significantly with increasing COVID-19 severity[39].

Age and regional factors

Patients aged 41 to 60 years were more likely to experience symptoms than those aged 18 to 40 years, possibly

due to an increase in the prevalence of comorbidities with age or a decrease in resistance and recovery ability. The proportion of patients with symptoms after recovery from COVID-19 was lower in northwest and northeast China than in central China, and the proportion of patients with non-gastrointestinal symptoms in the southwest region was also lower; this may be associated with the climatic factors and prevalent strains in these regions.

The COVID-19 epidemic is not yet over, and its short-term symptoms may become long-term and even cause other diseases. For the prevention and treatment of COVID-19 in the future, caution should be exercised, and symptomatic treatment should be administered as early as possible. Our team is also focusing on the long-term symptoms of patients undergoing COVID-19 rehabilitation, hoping to provide more useful information in the future.

Our study had some limitations. Although our sample covered data from 31 provinces in mainland China, there were limitations for persons who lived in remote areas or did not have access to on-line forms. The on-line questionnaire may have missed participants from remote areas or the elderly. The disproportionately high proportion of women may affect the reliability of the results. Failing to clarify whether the participants were confirmed cases or asymptomatic individuals may lead to reporting bias of symptoms. In addition, there is an insufficient explanation of regional differences: the risk of symptoms in Northeast and Northwest regions is relatively low, yet potential causes such as climate, medical resources, and living habits have not been thoroughly analyzed. Multivariable regression did not incorporate potential influencing factors such as vaccination status, severity of infection (eg, whether hospitalization was required), and types of underlying diseases.

In conclusion, this cross-sectional survey had a large sample size and we found that short-term symptoms of the respiratory, psychocardiology systems were most common after recovery from COVID-19. Sex, age, geographical region, and presence of comorbidities were potential influencing factors for the development of short-term symptoms. We suggest that future research should examine these aspects in more detail.

Conflict of interest statement

Junhua Zhang is editorial board members of this journal. Xinyao Jin is responsible editorial coordinator of this journal. The other authors declare no conflict of interest.

Funding

This research was funded by the Young Scientists Fund of the National Natural Science Foundation of China under 82305433, 82305437.

Author contributions

Junhua Zhang and Lujia Cao had full access to all of the study data and took responsibility for the integrity of the data and the accuracy of the data analysis. Junhua Zhang and Jingqing Hu contributed to the study concept, design, and study supervision. Wenliang Lyu, Li Liu, Wei Liu, Zhimin Yang, Yan Shi, Shuguang Yu, Candong Li, and Ming Yang contributed to the acquisition of data. Lujia Cao contributed to the analysis and interpretation of the data. Lujia Cao, Xiaolei Wu, Chenyao Zhang, and Chuanchi Wang contributed to the preparation of figures and drafting of the manuscript. All authors contributed to critical revision of the manuscript for important intellectual content, administrative, technical, or material support. Lujia Cao and Xiaolei Wu contributed to statistical analysis. Junhua Zhang contributed to funding acquisition.

Ethical approval of studies and informed consent

The study obtained approval from the Tianjin University of Traditional Chinese Medicine provided institutional review board approval (approval number: TJUTCM-EC20230002) and was conducted in accordance with the principles of the Helsinki Declaration. Before the commencement of the study, participants provided informed consent by signing a consent form.

Acknowledgments

We thank all the patients who participated in the study.

Data availability

Data are available from the data custodians on reasonable request when necessary. Approvals are in place.

References

[1] Luo X, Ni X, Lin J, et al. The add-on effect of Chinese herbal medicine on COVID-19: a systematic review and meta-analysis. *Phytomedicine* 2021;85:153282.
[2] Zhou L, Wu Z, Li Z, et al. One hundred days of coronavirus disease 2019 prevention and control in China. *Clin Infect Dis* 2021;72(2):332–339.
[3] Moeti M, Gao GF, Herrman H. Global pandemic perspectives: public health, mental health, and lessons for the future. *Lancet* 2022;400(10353):e3–e7.
[4] Liu J, Liu M, Liang W. The dynamic COVID-zero strategy in China. *China CDC Wkly* 2022;4(4):74–75.
[5] Pan Y, Wang L, Feng Z, et al. Characterisation of SARS-CoV-2 variants in Beijing during 2022: an epidemiological and phylogenetic analysis. *Lancet* 2023;401(10377):664–672.
[6] Groff D, Sun A, Ssentongo AE, et al. Short-term and long-term rates of postacute sequelae of SARS-CoV-2 infection: a systematic review. *JAMA Netw Open* 2021;4(10):e2128568.
[7] NIHR. Living with COVID-19. A dynamic review of the evidence around ongoing COVID-19 symptoms (often called long COVID). 2020;2023(04.27).
[8] CDC. Post-COVID conditions: information for healthcare providers. 2022;2023(2023/4/27).
[9] Datta SD, Talwar A, Lee JT. A Proposed framework and timeline of the spectrum of disease due to SARS-CoV-2 infection: illness beyond acute infection and public health implications. *JAMA* 2020;324(22):2251–2252.
[10] CACM. Expert consensus on the treatment of traditional Chinese medicine for common symptoms of post COVID-19 short-term condition (2023/5/13).
[11] Aranha C, Patel V, Bhor V, et al. Cycle threshold values in RT-PCR to determine dynamics of SARS-CoV-2 viral load: an approach to reduce the isolation period for COVID-19 patients. *J Med Virol* 2021;93(12):6794–6797.
[12] Abrahim SA, Tessema M, Defar A, et al. Time to recovery and its predictors among adults hospitalized with COVID-19: a prospective cohort study in Ethiopia. *PLoS One* 2020;15(12):e0244269.
[13] Voinsky I, Baristaite G, Gurwitz D. Effects of age and sex on recovery from COVID-19: analysis of 5769 Israeli patients. *J Infect* 2020;81(2):e102–e103.

[14] Young BE, Ong S, Kalimuddin S, et al. Epidemiologic features and clinical course of patients infected with SARS-CoV-2 in Singapore. *JAMA* 2020;323(15):1488–1494.
[15] Niu J, Rodriguez JA, Sareli C, et al. COVID-19 infection among first responders in Broward County, Florida, March-April 2020. *J Public Health (Oxf)* 2021;43(3):450–454.
[16] Fernandes Q, Inchakalody VP, Merhi M, et al. Emerging COVID-19 variants and their impact on SARS-CoV-2 diagnosis, therapeutics and vaccines. *Ann Med* 2022;54(1):524–540.
[17] Coronavirus disease (COVID-19): how is it transmitted? Apr 27, 2023.
[18] Ledford H. How severe are Omicron infections? *Nature* 2021;600(7890):577–578.
[19] Burki TK. Omicron variant and booster COVID-19 vaccines. *Lancet Respir Med* 2022;10(2):e17.
[20] Fan Y, Li X, Zhang L, et al. SARS-CoV-2 Omicron variant: recent progress and future perspectives. *Signal Transduct Target Ther* 2022;7(1):141.
[21] Nyberg T, Ferguson NM, Nash SG, et al. Comparative analysis of the risks of hospitalisation and death associated with SARS-CoV-2 omicron (B.1.1.529) and delta (B.1.617.2) variants in England: a cohort study. *Lancet* 2022;399(10332):1303–1312.
[22] Zhou Y, Yan X, Ma F, et al. Effects of moxibustion for COVID-19 convalescence: a protocol for systematic review and meta-analysis. *Medicine (Baltim)* 2021;100(14):e25389.
[23] Luo ZH, Wang KX, Zhang YL, et al. Thumb-tack needles based on "Biaoben acupoint compatibility" for sequela of COVID-19 during recovery period. *Zhongguo Zhen Jiu* 2022;42(3):281–286.
[24] Gu M, Liu J, Shi NN, et al. Analysis of property and efficacy of traditional Chinese medicine in staging prevention and treatment of coronavirus disease 2019. *Zhongguo Zhong Yao Za Zhi* 2020;45(6):1253–1258.
[25] Pang WT, Jin XY, Pang B, et al. Analysis on pattern of prescriptions and syndromes of traditional Chinese medicine for prevention and treatment of COVID-19. *Zhongguo Zhong Yao Za Zhi* 2020;45(6):1242–1247.
[26] Yin L, Gao Y, Li Z, et al. Analysis of Chinese herbal formulae recommended for COVID-19 in different schemes in China: a data mining approach. *Comb Chem High Throughput Screen* 2021;24(7):957–967.
[27] Tian J, Sun D, Xie Y, et al. Network pharmacology-based study of the molecular mechanisms of Qixuekang in treating COVID-19 during the recovery period. *Int J Clin Exp Pathol* 2020;13(10):2677–2690.
[28] Su KL, Xiong XJ. Treatment strategy and thought on classical herbal formulae for coronavirus disease 2019. *Zhongguo Zhong Yao Za Zhi* 2021;46(2):494–503.
[29] Takayama S, Namiki T, Odaguchi H, et al. Prevention and recovery of COVID-19 patients with kampo medicine: review of case reports and ongoing clinical trials. *Front Pharmacol* 2021;12:656246.
[30] Li T, Zhao M, Zhu MJ, et al. Xuanfei Baidu decoction, a Chinese herbal medicine for coronavirus disease 2019 (COVID-19): a randomized clinical trial. *Acupunct Herb Med*. 2023;3(3):207–212.
[31] Montani D, Savale L, Noel N, et al. Post-acute COVID-19 syndrome. *Eur Respir Rev* 2022;31(163):210185.
[32] Jacobs LG, Gourna PE, Lesky-Di BD, et al. Persistence of symptoms and quality of life at 35 days after hospitalization for COVID-19 infection. *PLoS One* 2020;15(12):e0243882.
[33] Carfi A, Bernabei R, Landi F. Persistent symptoms in patients after acute COVID-19. *JAMA* 2020;324(6):603–605.
[34] Sun LL, Wang J, Wang YS, et al. Symptomatic features and prognosis of 932 hospitalized patients with coronavirus disease 2019 in Wuhan. *J Dig Dis* 2021;22(5):271–281.
[35] Ettman CK, Abdalla SM, Cohen GH, et al. Prevalence of depression symptoms in US adults before and during the COVID-19 pandemic. *JAMA Netw Open* 2020;3(9):e2019686.
[36] Lyu M, Xiao GX, Wang SM, et al. "Three medicines and three formulas" in COVID-19: From bench to bedside. *Acupunct Herb Med*. 2023;3(4):309–322.
[37] Gallo G, Calvez V, Savoia C. Hypertension and COVID-19: current evidence and perspectives. *High Blood Press Cardiovasc Prev* 2022;29(2):115–123.
[38] Ahmad MJ, Ahmed S, Shinde M, et al. The impact of COVID-19 on comorbidities: a review of recent updates for combating it. *Saudi J Biol Sci* 2022;29(5):3586–3599.
[39] Xie Y, Al-Aly Z. Risks and burdens of incident diabetes in long COVID: a cohort study. *Lancet Diabetes Endocrinol* 2022;10(5):311–321.