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Coronavirus Pandemic

Post-COVID condition: a survey of patients recovered from COVID-19 in Central Vietnam

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Abstract

Introduction: Evidence on post–COVID-19 conditions is emerging. This study aims to assess post-COVID conditions and related factors in COVID-19 patients in Central Vietnam.

Methodology: A descriptive cross-sectional study was performed on people who have recovered from COVID-19 at least 2 weeks prior to the online survey. Participants were interviewed face-to-face after 6 and 9 months from the first survey.

Results: 53 patients (21.2%) were confirmed to have persistent symptoms, of which, 100% and 94.3% reported prolonged fatigue and full-body weakness respectively. Loss of appetite was reported by 90.6%, while persistent cough, insomnia, and trouble sleeping were reported by 86.3% of patients. Headaches and dyspnea were reported by 69.5% and 56.8% respectively, while other symptoms had lower rates. The prevalence of post-COVID condition showed a statistically significant relationship with the time of infection, duration of illness, treatment place, use of herbal medicine, adherence to the 5K message from Vietnam's Ministry of Health, and daily saltwater mouthwash ($p < 0.05$). However, the use of medicine and supplements was not related to the post-COVID condition ($p > 0.05$). After 6 months, 125 participants were interviewed face-to-face, and only 15 people (12.0%) reported having post-COVID symptoms, mainly prolonged fatigue (33.3%) and persistent cough (26.7%). After 9 months, these 15 patients no longer had symptoms related to the post- COVID-19 condition.

Conclusions: The post-COVID condition can persist for several weeks or months, but will mostly be in remission after 6 months, and completely resolve after 9 months from the onset of the infection.

Key words: COVID-19; post-COVID condition; long COVID; Central Vietnam.

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Introduction

Coronavirus disease 2019 (COVID-19) is a highly contagious disease caused by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). Since the onset of the COVID-19 pandemic, it has posed enormous challenges to the healthcare systems worldwide. As of April 1st, 2022, over 470 million cases of COVID-19 and 6 million deaths have been reported. However, a large proportion of infected cases remain unreported. The number of COVID-19 cases is still increasing after more than two years of the pandemic. Fortunately, the number of symptomatic cases and severe cases only account for a small percentage, resulting in a significant reduction in deaths. The majority of COVID-19 patients return to normal health after about two weeks of infection. Nevertheless, accumulating evidence highlighted that an uncertain proportion of patients have experienced a variety of mid-and long-term effects after recovering from their initial illness. These mid- and long-term effects are collectively known as the post-COVID condition, or the "long COVID" [1]. Studies from different regions of the world have revealed that the post-COVID condition extends beyond the cardio-respiratory system and affects most other bodily systems both anatomically and physiologically, including gastrointestinal,

neurological, psychiatric, and dermatological systems [2-4]. Many individuals experienced a variety of persistent symptoms after COVID-19, with dyspnea, persistent cough, myalgia, fatigue, hair loss, heart palpitations, headache, and anxiety or depression among the most common sequelae. Additionally, some experienced digestive disorders such as loss of appetite, diarrhea, smell and taste disorders etc. [4].

The World Health Organization (WHO) has recently released the first official definition of the post-COVID condition. According to WHO, post-COVID condition is defined as the illness that occurs in people who have a history of SARS-CoV-2 infection, usually within three months from the onset of COVID-19, with symptoms and effects that last for at least two months and cannot be explained by an alternative diagnosis [5]. Recent studies have showed that approximately 33-76% of patients could experience persistent symptoms after recovering from COVID-19 [2,4,7]. Certain groups of patients may be at a higher risk of developing long COVID, including those with underlying conditions (e.g. hypertension, coronary artery disease, diabetes, metabolic disorders, etc.); patients over 60 years of age (who are at risk for co-morbidities that have not yet started, but may promote the conditions after COVID-19); patients who were hospitalized with severe symptoms after infection (such as respiratory failure, high fever, etc.); pediatric patients < 11 years old, etc. In addition, various factors such as work, income, drugs use, and isolation treatment can also be risks of increasing the frequency of post-COVID-19 symptoms [8,9].

Based on data collected in Hanoi and Ho Chi Minh City, Vietnam, there are hundreds of patients visiting hospitals daily for post-COVID-19 check-up. Most of these patients are over 60 years old. Additionally, there are young adults suffering from respiratory failure after COVID-19, and some need to be hospitalized for treatment. Till date, no studies have been conducted on the post-COVID condition in the Central provinces of Vietnam. This study is an online survey using a set of questionnaires on several issues regarding COVID-19 and post COVID-19 condition, followed by a face-to-face interview of the participants from the first survey after 6 months and 9 months, to provide an assessment of the impact of long COVID and related factors in Central Vietnam in 2022.

Methodology

Research subjects

Since this survey aimed to investigate the prevalence of post-COVID syndrome, participants who had had COVID-19 at least a month prior were included in the survey. Only those participants who had recovered from COVID-19 (confirmed by negative SARS-CoV-2 rapid antigen or polymerase chain reaction, PCR test) for at least 2 weeks up to the time of the online survey in March, 2022 were included.

Research design

The online survey was a descriptive cross-sectional study using a questionnaire. The sample size was calculated by the formula:

$$n = Z^2_{(1-\alpha/2)} \times \frac{p \times q}{d^2} = 224.5 \approx 225 \; samples$$

where: n was the sample size; α=5%; $Z^2_{(1-\alpha/2)} = 1.96^2$; p was the expected the prevalence of the post-COVID condition, estimated at around 30% [2]; d was the estimated error 0.06. The sample size was calculated as 225. A total of 250 individuals participated in this survey.

Data collection

The first online survey in March 2022 requested information on age, gender, occupation, residence, characteristics of acute COVID-19 (fever, cough, dyspnea, other symptoms), history of hospitalization (duration, severity, length of hospital stay, need for mechanical ventilation), duration since symptoms onset, and presence of persistent symptoms: general symptoms (fever, fatigue or full-body weakness, exhaustion), respiratory symptoms (dyspnea, cough), neuropsychiatric symptoms (headache, insomnia, trouble sleeping), and digestive symptoms (loss of appetite or poor eating). The data collected from the questionnaire were automatically recorded in the author's computer.

The second survey was conducted after 6 months (in September 2022), with 125 participants and the third survey was conducted after 9 months (in December 2022) with 15 participants who had also participated in the first survey, through a face-to-face interview.

Statistical processing

Incomplete and inconsistent data were excluded from the analysis. The data was cleaned and transferred to the Statistical Package for Social Science (SPSS) version 21.0 for analysis. Descriptive statistics are presented as percentages. The χ^2 test was used to determine the association of categorical variables. A p value < 0.05 was considered to be statistically significant.

Results

Most of the participants were from 18 to 60 years old (91.2%). Only 8.0% participants were > 60 years old and 2 participants (0.8%) were < 18 years old. The numbers of men and women in the study were equivalent. The occupational distribution of subjects showed no significant differences among students, public employees, and health workers. The groups of retirees, other occupations, and farmers accounted for very a low percentage. Most of the participants lived in urban areas and cities and only a few participants lived in rural areas (19.2%) (Table 1).

Since our initial survey in mid-March 2022, additional participants in the study contracted the disease mainly in the early 2022 (69.6%). 63.6% had a disease duration of less than 1 week, while only 4.0% had cases that lasted over 2 weeks. The majority of the participants (65.6%) self-monitored and cared for themselves at home, while 30.4% were under isolation management, and only 4.0% required admission to medical facilities for treatment. Among the main symptoms of COVID-19, cough accounted for 61.2%, while fever, dyspnea, and other symptoms were less frequent at less than 50%. 12.4% of the participants required hospitalization for monitoring and 13.2% required outpatient care (Table 2).

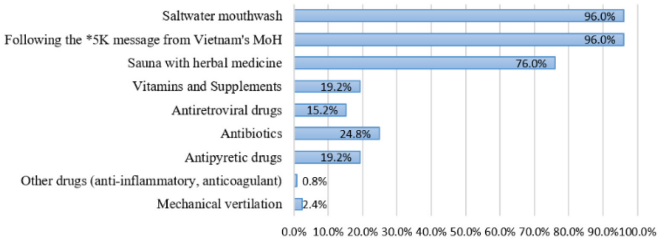
There were 6 participants (2.4%) who required mechanical ventilation during the treatment. About 20% of the participants used antipyretic drugs, antibiotics, antiviral drugs, vitamins, and supplements. Only a small proportion of the participants used anti-inflammatory and anticoagulant drugs (0.8%). About 76.0% of the participants utilized the traditional method of sauna with herbs. Most participants followed the 5K message of Vietnam's Ministry of Health (MoH) and practiced daily saltwater mouthwash (96.0%) (Figure 1). 5K messages from Vietnam's Ministry of Health recommend facemask, disinfection, distance, no gathering, and health declaration for the prevention of COVID-19 [10].

A total of 197 participants fully recovered from COVID-19 (78.9%), while only 53 participants (21.2%) reported persistence of post-COVID-19 symptoms. All participants with post-COVID condition reported

Table 1. Demographical characteristics of participants (n = 250).

Demographical characteristics	n (%)
Age	
< 18	2 (0.8)
18-60	228 (91.2)
> 60	20 (8.0)
Gender	
Male	120 (48.0)
Female	130 (52.0)
Occupation	
Student	86 (34.4)
Employee	75 (30.0)
Medical worker	61 (24.4)
Retirement, other	25 (10.0)
Farmer	3 (1.2)
Residence	
Urban	43 (17.2)
City	159 (63.6)
Rural	48 (19.22)

Figure 1. Percentage of care and treatment measures in patients with COVID-19 (n = 250).



*5K messages from Vietnam's Ministry of Health recommend facemask, disinfection, distance, no gathering, and health declaration for the prevention of COVID-19 [10].

Table 2. Acute COVID-19 characteristics.

Acute COVID-19 characteristics	n = 250 (%)
Time of infection	
2021	76 (30.4)
2022	174 (69.6)
Duration since symptoms onset	
Less than 1 week	159 (63.6)
Less than 2 weeks	81 (32.4)
More than 2 weeks	10 (4.0)
Treatment place	
At home	164 (65.6)
At isolation area	76 (30.4)
At medical facilities	10 (4.0)
Fever > 38 °C	
Yes	106 (42.4)
No	144 (57.6)
Cough	
Yes	153 (61.2)
No	97 (38.8)
Dyspnea	
Yes	68 (27.2)
No	182 (72.8)
Other symptoms	
Yes	119 (47.6)
No	131 (52.4)
Hospitalization	
Yes	31 (12.4)
No	219 (87.6)
Outpatient visit	
Yes	33 (13.2)
No	217 (86.8)

prolonged fatigue, and 94.3% reported full-body weakness symptoms. Loss of appetite was reported in 90.6% of post-COVID-19 symptoms, while persistent cough, insomnia, and trouble sleeping accounted for 86.3%. Headache was reported in 69.5% of the participants, dyspnea in 56.8%, and other symptoms had a lower incidence rate. Patients may have experienced several symptoms concurrently, resulting in a 66.0% exhaustion rate (Figure 2).

There was no significant relationship between participants who suffered from long COVID and their age, gender, and occupation ($p > 0.05$). However, participants residing in rural areas had a lower prevalence of long COVID-19 compared to those living in urban areas ($p < 0.05$) (Table 3).

The participants who contracted COVID-19 in 2021 had a lower incidence of long COVID-19 than those who were infected in 2022. Participants with a COVID-19 duration of more than 2 weeks had a higher incidence of post-COVID condition than those who experienced a shorter duration of illness. Patients who were hospitalized or admitted to isolation areas had higher rates of post-COVID condition than those who had in-home care. In this study cohort, there was a statistically significant relationship between the time of infection, duration of infection, treatment location, use of herbal medicine sauna, 5K message implementation, saltwater mouthwash, and prevalence of post-COVID condition ($p < 0.05$). Meanwhile, the use of antipyretic drugs, antiretroviral drugs, antibiotics, vitamins, supplements, and other drugs did not show a significant relationship with the prevalence of post-COVID condition ($p > 0.05$) (Table 4).

Six months after the first survey, 125 participants underwent face-to-face interviews in September 2022. Most of the participants had fully recovered from COVID-19 (88.0%), while only 15 participants (12.0%) reported experiencing post-COVID symptoms, mainly prolonged fatigue (33.3%) and persistent cough (26.7%). The number of patients experiencing dyspnea on exertion had decreased to 20%, and those experiencing symptoms such as headache, insomnia, trouble sleeping had decreased to 13.3%. Other symptoms such as weakness, loss of appetite and exhaustion had disappeared entirely (Figure 3).

As of December 2022, all 15 participants who had reported persistent symptoms from the second survey (100%) confirmed that they no longer had any symptoms related to COVID-19. All the participants had recovered after 9 months from the first survey.

Figure 2. Percentage of persistent symptoms in patients with the post-COVID condition in the online survey (n = 53).

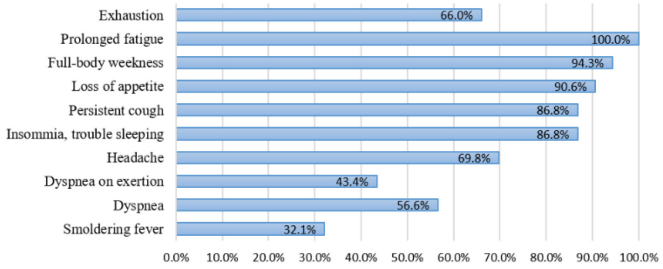


Table 3. Relationship between demographical characteristics and prevalence of the post-COVID condition of participants.

Research subjects	Patients with post-COVID-19 symptoms (n = 53)		Patients without post-COVID-19 symptoms (n = 197)		*p*
	n	%	n	%	
Age					
< 18	0	0	2	100.0	
18-60	47	20.6	181	79.4	> 0.05
> 60	6	30.0	14	70.0	
Gender					
Male	26	21.7	94	78.3	> 0.05
Female	27	20.8	103	79.2	
Occupation					
Student	13	15.1	73	84.9	
Employee	19	25.3	56	74.7	
Medical worker	14	22.9	47	77.1	> 0.05
Retirement, other	6	24.0	19	76.0	
Farmer	1	33.3	2	66.7	
Residence					
Urban	8	18.6	35	81.4	
City	42	26.4	117	73.6	**< 0.05**
Rural	2	4.2	46	95.8	

Bold font indicates statistical significance.

Discussion

Out of the 250 patients who participated in our study, the majority were aged between 18-60 years old (91.2%). Only 8.0% of patients were over 60 years old, while a mere 0.8% were under 18 years old. The ratio of men to women in our study was similar and shared common demographic characteristics with the study of Bircan Kayaaslan [2]. The participants mainly resided in urban areas and cities. Only 19.2% of all participants lived in rural areas. The difference in age groups and residences can be explained by the inconvenience of answering questionnaires online, which makes it difficult for the elderly group and people who live in rural areas. The group of retirees and farmers accounted for very a low percentage because of similar reason. The collection of data by online survey and the quite modest number of participants are the two main limitations of this study. A recent online survey by Gabriella Imbriano *et al.* also had a modest number of participants with 261 patients, however, their study yielded many practical results [9].

In our survey, majority of the patients (65.6%) self-monitored and received care at home. Additionally, 30.4% of the patients were cared for in isolation areas, while only 4.0% required admission in medical facilities for treatment Corticosteroids were used in some patients with serious condition. Severe cases in the hospital also used the antiviral drug Monulpiravir in combination with other supportive drugs according to the guideline of the MoH (at the time, Resolution 128/NQ-CP 2021 of the Vietnam Government on Interim Regulation on safe and flexible adaptation to COVID-19 pandemic was applied) [11]. Among the patients, 12.4% required hospitalization for monitoring, typically severe cases, those with available serious diseases, and the elderly, while 13.2% required outpatient care.

Figure 3. Percentage of persistent symptoms in patients with post-COVID conditions from the face-to-face interview after 6 months (n = 15).

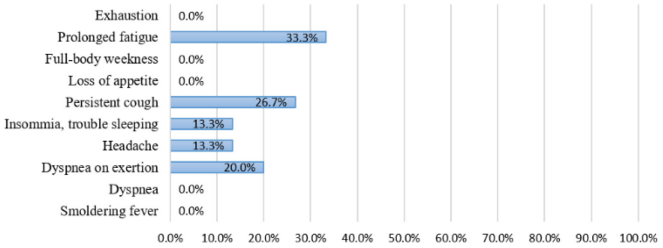


Table 4. Relationship between care factors and the prevalence of the post-COVID condition of participants.

Acute COVID-19 characteristics and treatment measures		Participants with post-COVID-19 symptoms (n = 53)		Participants without post-COVID-19 symptoms (n = 197)		*p*
		n	%	n	%	
Time of infection	In 2021	4	5.3	72	94.7	**< 0.05**
	In 2022	49	28.2	125	71.8	
Duration since symptoms onset	Less than 1 week	2	1.3	157	98.7	**< 0.05**
	Less than 2 weeks	45	55.6	36	44.4	
	More than 2 weeks	6	60.0	4	40.0	
Treatment place	At home	6	3.7	158	96.3	**< 0.05**
	At isolation area	38	50.0	38	50.0	
	At medical facilities	9	90.0	1	10.0	
Mechanical ventilation	Yes	1	16.7	5	83.3	> 0.05
	No	52	21.3	192	78.7	
Using antipyretic drugs	Yes	10	20.8	38	79.2	> 0.05
	No	43	21.3	159	78.7	
Using antibiotics	Yes	13	20,9	49	79,1	> 0.05
	No	40	21,3	148	78,7	
Using antiretroviral drugs	Yes	10	26,3	28	73,7	> 0.05
	No	43	20,3	169	79.7	
Using supplements and vitamins	Yes	10	20,8	38	79,2	> 0.05
	No	43	21,3	159	78,7	
Herbal sauna	Yes	9	4,7	181	95,3	**< 0.05**
	No	44	73,3	16	26,7	
Following *5K messages	Yes	49	20,4	191	79,6	**< 0.05**
	No	4	40,0	6	60,0	
Saltwater mouthwash	Yes	48	20,0	192	80,0	**< 0.05**
	No	5	50,0	5	50,0	

Bold font indicates statistical significance.

Our study revealed that approximately 50% of COVID-19 patients displayed no symptoms. Coughing was the most common manifestation, accounting for 61.2%, while fever, dyspnea, and other symptoms were less frequent, at less than 50%. Our survey results were consistent with those of Carfi A *et al*. [4], who also reported similar data on COVID-19 patient symptoms. In the survey of Bircan Kayaaslan, although the parameters are more detailed, the rate of the main symptoms such as cough, dyspnea, and fever showed a corresponding result. However, it is difficult to compare our results with Bircan Kayaaslan's study since they used a quantitative method to group and score symptoms at different levels [2].

In accordance with guidance from the Vietnam MoH, hospitalized COVID-19 patients were stratified, with only 12.4% admitted for monitoring, and six patients (2.4%) requiring mechanical ventilation. About one-fifth of the participants used antipyretic drugs, antibiotics, antiviral drugs, vitamins, and other supplements. Very few COVID-19 patients used anti-inflammatory and anticoagulant drugs (0.8%). Compared with other studies, drugs used in COVID-19 patients were relatively limited, as treatment adhered to the guidelines of the MoH [12]. Interestingly, many participants, mainly those who were cared for at home, applied traditional medicine, and 76.0% using sauna with herbal medicine. Another important finding was that 96.0% of COVID-19 patients complied with the 5K message from the Vietnam's MoH (including wearing facemask, disinfecting, keeping distance, avoiding gathering, health declaration) together with daily saltwater mouthwash. These activities showed significant effectiveness in reducing the risk of spreading SARS-CoV-2 and the risk of the post-COVID condition [12].

In our study, a high percentage of COVID-19 patients (78.9%) fully recovered from the disease. Only 53 patients (21.2%), had persistent symptoms, which is consistent with the prevalence of the post-COVID condition reported in various studies worldwide [3,6,8,13,14]. Among the persistent symptoms, prolonged fatigue and full-body weakness accounted for the highest rate with 100% and 94.3%, respectively, followed by loss of appetite at 90.6%. Additionally, 86.3% of patients experienced persistent cough, insomnia, and sleeping difficulties. Patients who suffered from headaches and dyspnea accounted for 69.5% and 56.8%, respectively, while other symptoms had a lower rate of incidence. It is important to note that patients may suffer from several symptoms simultaneously, therefore, about 66.0% of them felt exhaustion. Obviously, the "long COVID-19" problem is becoming increasingly serious. Regardless of the disease's previous characteristics, intense or mild symptoms, or even no symptoms, many patients still suffered from various symptoms after recovering from the disease [3,6,8,13,14]. This issue has gained increasing attention from authors worldwide, as well as from the World Health Organization.

We evaluated some demographical factors that may be associated with the post-COVID condition and found that there was no significant relationship between age, gender, and occupation and the post-COVID condition in participants of our study ($p < 0.05$). However, patients living in rural areas had a lower rate of long COVID than those in urban areas ($p < 0.05$). This survey result is consistent with findings from several studies [13,15,16]

The study results indicate that patients who were infected with COVID-19 in 2022 had a higher prevalence of long COVID compared to those infected in 2021. Besides, patients with a longer illness duration of more than 2 weeks had a high prevalence of long COVID in comparison with patients whose duration of illness is shorter. Patients who were admitted to the isolated area had a higher rate of post-COVID condition than those who were cared for at home. There was a statistically significant relationship between time of infection, duration of infection, treatment place, use of herbal sauna, 5K message implementation, saltwater mouthwash, and prevalence of post-COVID condition ($p < 0.05$). This finding emphasizes the importance of following the guidelines set by the Vietnam's MoH to reduce the risk of post-COVID condition [12]. The use of antipyretic, antibiotic, antiviral drugs as well as supplements, vitamins, and other drugs was not related to the post-COVID condition ($p > 0.05$). Importantly, it is crucial to use drugs according to the indications and instructions of the MoH [12].

After 6 months from the first survey, most of the patients had fully recovered from COVID-19 (88.0%), while only 15 individuals (12.0%) reported experiencing post-COVID symptoms. The most common persistent symptoms were prolonged fatigue (33.3%) and persistent coughs (26.7%), whereas symptoms such as dyspnea on exertion, headache, insomnia, trouble sleeping decreased to less than 20%. Other symptoms such as weakness, loss of appetite and exhaustion had completely disappeared. According to the Centers for Disease Control and Prevention, post-COVID condition could prolong for several weeks, months or years [17]. Nevertheless, in the third survey conducted after 9 months from the first one, all the

patients had completely recovered. Vaccination may play a crucial role in reducing the prevalence and relieving of symptoms of post-COVID condition, given that Vietnam has vaccinated 90% of its population against COVID-19 as of 28 February 2022 [18]. However, further study is needed to clarify the impact of vaccination on the prevalence of post-COVID condition.

Clinically, the post-COVID condition can be divided into two stages: ongoing symptomatic COVID-19 (one to two months after infection) and post-COVID-19 syndrome (after two months) [1]. In our survey, we did not determine which stages the patients were in. The post-COVID condition can affect the patient's ability to return to work or participate in social life at any stage. However, based on our results, the post-COVID condition was most likely in remission after 6 months, and patients had no more symptoms about 9 months after infection.

Conclusions

Among the 250 patients infected with COVID-19 in the first survey, only 53 patients (21.2%) experienced persistent symptoms. Among them, prolonged fatigue and full-body weakness accounted for the highest rate (100% and 94.3%, respectively), followed by loss of appetite (90.6%). In addition, 86.3% of patients experienced persistent cough, insomnia, and trouble sleeping. Patients with headaches and dyspnea accounted for 69.5% and 56.8%, respectively, while other symptoms were less frequent. There was a statistically significant relationship between the prevalence of post-COVID condition and factors including the time of infection, duration of disease, treatment place, use of sauna with herbal medicine, adherence to the 5K message of the Ministry of Health, and saltwater mouthwash daily ($p < 0.05$). The use of antipyretic drugs, antibiotics, antiviral drugs, vitamins and supplements was not related to the post-COVID condition in our survey group ($p > 0.05$).

Most patients recovered from COVID-19 within 6 months, with only 15 people (12.0%) experiencing post-COVID symptoms, mainly prolonged fatigue (33.3%) and persistent coughs (26.7%). Other symptoms were in remission or completely disappeared. All patients were fully recovered after about 9 months from the onset of the infection.

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