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# An initial assessment of status of post-COVID-19 symptoms in Vietnamese students

**Dinh-Toi Chu[1, 2, *], Hue Vu Thi[1, 2], Yen Vy Nguyen Thi[1, 2], Thuy Duong Vu[1], Linh Thao Tran[1], Quoc Cuong Bui[1], Chuc Hoang Thi[1, 2], Thai Van Than[1, 2]**

[1]Center for Biomedicine and Community Health, International School, Vietnam National University, Hanoi, Vietnam
[2]Faculty of Applied Sciences, International School, Vietnam National University, Hanoi, Vietnam

***Corresponding author**
Dinh-Toi Chu, PhD
Center for Biomedicine and Community Health, International School, Vietnam National University, Hanoi, Vietnam
Email: chudinhtoi.hnue@mail.com

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## ABSTRACT

A cross-sectional descriptive study through the online survey was conducted within a month to describe the status of post-COVID-19 symptoms, quality of life, and related factors among Vietnamese students. The questionnaire consists of three main parts: Part 1: Personal information; Part 2: The post-COVID-19 symptoms; and Part 3: Quality of life (EQ-5D). A total of 402 Vietnamese students over 18 years old had complete responses. Surprisingly, up to 78% of the total reported experiencing at least one post-COVID-19 symptom. Of these, the most reported symptoms were neurological (66.17%). Digestive symptoms were relatively uncommon with only 14.18%. Regarding the quality of life, some reported problems with pain and discomfort (25.62%), and anxiety (37.56%). Self-rated health was a related factor to both the status of post-COVID-19 symptoms and quality of life. These findings suggested that more studies are needed to explore potential treatments for alleviating symptoms and improving the quality of life in recovered patients in the future.

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## INTRODUCTION

Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) is responsible for the coronavirus disease 2019 (COVID-19) pandemic. Globally, the COVID-19 pandemic has caused significant effects on millions of people's health and quality of life [1]. The prevalence of post-COVID-19 symptoms has been recorded by hospitalized COVID-19 patients, ranging from 32.6% to 87% [2]. Low mood, anxiety, sleep disturbances, memory impairment, inattention, and cognitive impairment are other symptoms that women may experience [3]. The COVID-19 pandemic also has significantly impacted Vietnam, with the country seeing a sudden rise in cases since April 2020. While Vietnam has successfully contained the virus, post-COVID-19 symptoms have been reported among Vietnamese people, including its impact on physical and mental health [4]. Primarily, students require special attention as post-COVID-19 symptoms may impair their health and quality of learning. Meanwhile, at present, there is no evidence in the status of the symptoms of the symptoms of COVID-19 and the quality of life of Vietnamese students. Thus, we conducted this research with the intention of describing the status of post-COVID-19 symptoms and quality of life in Vietnamese students and its related factors.

## MATERIALS AND METHODS

### Study design

A cross-sectional study was conducted through an online survey within a month in Vietnamese students.

### Research subjects

All Vietnamese students over 18 years old and currently living in Vietnam participated in the survey nationwide for convenience sampling.

### Data collection

The online survey was conducted via Google Forms within a month. The questionnaire has been built consisting of three main parts: Part 1: Personal information; Part 2: The post-COVID-19 symptoms (based on the definition and symptom classification of CDC) [5]; and Part 3: Quality of life EuroQol-5D (EQ-5D) [6]. Our study also did not cause any risks to participants and did not perform well for vulnerable subjects. Before answering the survey questions, the participants were provided with complete information about the purpose of the research, as well as anonymity and information security. If they agree to participate in the research, the participants press 'Next' and start answering the survey question. All survey respondents who responded that they had COVID-19 would then be selected for this study.

### Sample size of the study

We calculated based on the sample size formula for a ratio as below:

$$n = Z^2_{(1-\frac{\alpha}{2})}\frac{p(1-p)}{d^2}$$

Where $p$=0.76 is the estimated rate (Based on the rate of 76% of patients with at least one post-COVID-19 symptom in Wuhan [7]. $d$= 0.05 is the desired deviation from p. $Z$= 1.96 is Z score corresponds to a 95% CI confidence interval. Substituting into the formula, $n$=280 is the minimum sample size for this study. In fact, 402 responses have been collected during data collection.

### Statistical analysis

STATA 14 was used for data analysis. Descriptive statistics were used to analyze the characteristics of subjects, the status of post-COVID-19 symptoms, and quality of life. The chi-square test was used to test the difference between males and females. We used univariate and multivariate logistic regression to find out the related factors. The difference was considered statistically significant with $p < 0.05$.

## RESULTS

### Characteristics of the study subjects

A total of 402 people responded to the survey, with 29.35% males and 70.65% females; 94.78% aged between 18 and 22 (p-value=0.017); 96.27% Kinh ethnic and 98.01% single. The number of people infected with COVID-19 at once time accounted for 89.05%

(p=0.016). Most participants treated COVID-19 by themselves at home (96.27%). Nearly half of respondents (44.03%) got two vaccination doses. Self-assessment of health was significantly different between males and females (p<0.001), in which only around 54.58% of females are in good or very good health, compared to approximately 83.05% of males (Table 1).

**Table 1.** Characteristics of the study subject.

| | Male | | Female | | Total | | p-value |
|---|---|---|---|---|---|---|---|
| | n | % | n | % | n | % | |
| Age | | | | | | | |
| 18-22 | 107 | 90.68 | 274 | 96.48 | 381 | 94.78 | 0.017* |
| >22 | 11 | 9.32 | 10 | 3.52 | 21 | 5.22 | |
| Ethnicity | | | | | | | |
| Kinh | 114 | 96.61 | 273 | 96.13 | 387 | 96.27 | 0.816 |
| Others | 4 | 3.39 | 11 | 3.87 | 15 | 3.73 | |
| Marital status | | | | | | | |
| Married | 0 | 0 | 1 | 0.35 | 1 | 0.25 | |
| Single | 115 | 97.46 | 279 | 98.24 | 394 | 98.01 | 0.596 |
| Others | 3 | 2.54 | 4 | 1.41 | 7 | 1.74 | |
| How many times have been infected with COVID-19? | | | | | | | |
| Once | 103 | 87.29 | 255 | 89.79 | 358 | 89.05 | |
| Twice | 11 | 9.32 | 24 | 8.45 | 35 | 8.71 | 0.571 |
| >2 time | 4 | 3.39 | 5 | 1.76 | 9 | 2.24 | |
| How long ago did you infect with COVID-19 for the first time? | | | | | | | |
| <1 month | 8 | 6.78 | 12 | 4.23 | 20 | 4.98 | |
| 1-3 months | 5 | 4.24 | 25 | 8.8 | 30 | 7.46 | |
| 3-6 months | 33 | 27.97 | 70 | 24.65 | 103 | 25.62 | 0.016* |
| 6 months – 1 year | 51 | 43.22 | 153 | 53.87 | 204 | 50.75 | |
| > 1 year | 21 | 17.8 | 24 | 8.45 | 45 | 11.19 | |
| Where do you get treatment? | | | | | | | |
| Hospital | 2 | 1.69 | 2 | 0.7 | 4 | 1 | |
| At home | 115 | 97.46 | 272 | 95.77 | 387 | 96.27 | 0.220 |
| Isolation zone | 1 | 0.85 | 10 | 3.52 | 11 | 2.74 | |
| Others | 0 | 0 | 0 | 0 | 0 | 0 | |
| Chronic disease before being injected with COVID- 19 | | | | | | | |
| No | 117 | 99.15 | 274 | 96.48 | 391 | 97.26 | 0.135 |
| Yes | 1 | 0.85 | 10 | 3.52 | 11 | 2.74 | |
| Received the COVID-19 vaccine before being injected with COVID- 19 | | | | | | | |
| Not injected | 7 | 5.93 | 15 | 5.28 | 22 | 5.47 | |
| Received the first dose | 19 | 16.1 | 68 | 23.94 | 87 | 21.64 | 0.362 |
| Received two doses | 54 | 45.76 | 123 | 43.31 | 177 | 44.03 | |
| Received two and extra doses | 38 | 32.2 | 78 | 27.46 | 116 | 28.86 | |
| Self-rate health | | | | | | | |
| Very good | 42 | 35.59 | 47 | 16.55 | 89 | 22.14 | |
| Good | 56 | 47.46 | 108 | 38.03 | 164 | 40.8 | |
| Fair | 20 | 16.95 | 118 | 41.55 | 138 | 34.33 | <0.001* |
| Poor | 0 | 0 | 11 | 3.87 | 11 | 2.74 | |
| Very poor | 0 | 0 | 0 | 0 | 0 | 0 | |

*The difference is statistically significant with p<0.05 by Chi-square test

### Status of post-COVID-19 symptoms and its related factors

Most participants (78.86%) reported experiencing at least one post-COVID-19 symptom. Of those, the most commonly reported symptoms were neurological, with 66.17% of participants, followed by respiratory and heart symptoms with 61.96%. Regarding neurological symptoms, a large proportion of participants struggled with thinking and concentration (46.77%), followed by sleep problems (40.8%) and headaches (40.55%).

Within the respiratory and heart symptoms, coughing was experienced by 40.3% of respondents, and shortness of breath was recorded in 36.57%. Only self-rated health was associated with post-COVID-19 symptoms (p<0.05) (Table 2 and 3).

**Table 2.** Status of post-COVID-19 symptoms.

| Post-COVID-19 symptoms | Male | | Female | | Total | | |
|---|---|---|---|---|---|---|---|
| | n | % | n | % | n | % | p-value |
| General symptoms | 53 | 44.92 | 145 | 51.06 | 198 | 49.25 | 0.262 |
| Tiredness | 49 | 41.53 | 136 | 47.89 | 185 | 46.02 | 0.244 |
| Fatigue | 22 | 18.64 | 66 | 23.24 | 88 | 21.89 | 0.310 |
| Fever | 32 | 27.12 | 38 | 13.38 | 70 | 17.41 | 0.001* |
| Respiratory and heart symptoms | 68 | 57.63 | 180 | 63.38 | 248 | 61.69 | 0.280 |
| Difficulty breathing | 23 | 19.49 | 75 | 26.41 | 98 | 24.38 | 0.141 |
| Shortness of breath | 32 | 27.12 | 115 | 40.49 | 147 | 36.57 | 0.011 |
| Cough | 52 | 44.07 | 110 | 38.73 | 162 | 40.30 | 0.321 |
| Chest pain | 18 | 15.25 | 42 | 14.79 | 60 | 14.93 | 0.905 |
| Fast-beating or pounding heart | 19 | 16.10 | 60 | 21.13 | 79 | 19.65 | 0.248 |
| Neurological symptoms | 67 | 56.78 | 199 | 70.07 | 266 | 66.17 | 0.010* |
| Difficulty thinking or concentrating | 43 | 36.44 | 145 | 51.06 | 188 | 46.77 | 0.007* |
| Headache | 43 | 36.44 | 120 | 42.25 | 163 | 40.55 | 0.280 |
| Sleep problems | 40 | 33.90 | 124 | 43.66 | 164 | 40.80 | 0.070 |
| Dizziness when you stand up (lightheadedness) | 20 | 16.95 | 69 | 24.30 | 89 | 22.14 | 0.106 |
| Pins-and-needles feelings | 19 | 16.10 | 34 | 11.97 | 53 | 13.18 | 0.265 |
| Change in smell or taste | 24 | 20.34 | 38 | 13.38 | 62 | 15.42 | 0.078 |
| Depression or anxiety | 22 | 18.64 | 64 | 22.54 | 86 | 21.39 | 0.386 |
| Digestive symptoms | 20 | 16.95 | 37 | 13.03 | 57 | 14.18 | 0.305 |
| Diarrhea | 14 | 11.86 | 20 | 7.04 | 34 | 8.46 | 0.114 |
| Stomach pain | 18 | 15.25 | 34 | 11.97 | 52 | 12.94 | 0.372 |
| Other symptoms | 28 | 23.73 | 132 | 46.48 | 160 | 39.8 | <0.001* |
| Joint or muscle pain | 28 | 23.73 | 84 | 29.58 | 112 | 27.86 | 0.234 |
| Rash | 8 | 6.78 | 7 | 2.46 | 15 | 3.73 | 0.037 |
| Changes in menstrual cycles | 6 | 5.08 | 92 | 32.39 | 98 | 24.38 | <0.001* |
| Total | 82 | 69.49 | 235 | 82.75 | 317 | 78.86 | 0.003* |

*The difference is statistically significant with p<0.05 by Chi-square test

**Table 3.** Related factors to the status of post-COVID-19 symptoms.

| At least 1 post-COVID-19 symptom | No/Yes | Univariate | | Multivariate | |
|---|---|---|---|---|---|
| | | OR (95% CI) | p-value | OR (95% CI) | p-value |
| Age | | | | | |
| 18-22 | 77/304 | 1 | - | 1 | - |
| >22 | 8/13 | 0.412 (0.165-1.028) | 0.057 | 0.472 (0.180-1.237) | 0.127 |
| Self-rate health | | | | | |
| Very good | 37/52 | 1 | - | 1 | - |
| Good | 31/133 | 3.053 (1.718-5.424) | <0.001* | 3.005 (1.687-5.353) | <0.001* |
| Fair | 17/121 | 5.064 (2.618-9.797) | <0.001* | 4.974 (2.565-9.643) | <0.001* |
| Poor | 0/11 | - | - | - | - |
| Very poor | 0/0 | - | - | - | - |

*The difference is statistically significant with p<0.05 by univariate and multivariate logistic regression

## Quality of life and its related factors

Most participants had no problems with mobility (91.29%). 11.69% of the total had a problem with usual activities, and a quarter (25.62%) felt pain or discomfort. Self-care and anxiety or depression were significantly different between males and females (p<0.05), in which 9.32% and 3.17% self-care problems were reported in males and females, respectively, and 23.73% of males and 43.31% of females had anxiety (Figure 1).Three related factors to the quality of life were the time of first infection with COVID-

19, having chronic disease before COVID-19 infection and self-rated health ($p<0.05$) (Table 4).

**Table 4.** Related factors to the quality of life.

| The problem in quality of life | Mean | SD | p-value |
|---|---|---|---|
| How long ago did you get infected with COVID-19 for the first time? | | | |
| <1 month | 1.46 | 0.77 | |
| 1-3 months | 1.28 | 0.39 | |
| 3-6 months | 1.26 | 0.41 | 0.040* |
| 6 months – 1 year | 1.21 | 0.33 | |
| > 1 years | 1.17 | 0.28 | |
| Chronic disease before injected with COVID-19 | | | |
| No | 1.22 | 0.36 | 0.017* |
| Yes | 1.71 | 0.86 | |
| Self-rate health | | | |
| Very good | 1.11 | 0.25 | |
| Good | 1.23 | 0.34 | |
| Fair | 1.30 | 0.49 | 0.002* |
| Poor | 1.36 | 0.25 | |
| Very poor | 0.00 | 0.00 | |

*The difference is statistically significant with $p<0.05$ by one-way ANOVA

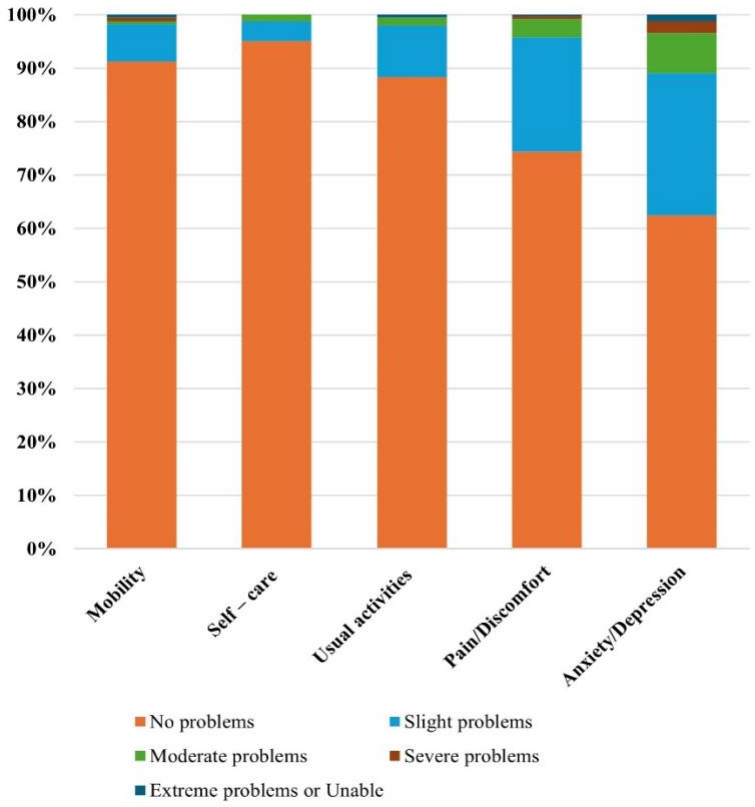


**Figure 1.** The quality of life of the study subjects.

## DISCUSSION

Up to now, more than 80 relevant post-COVID-19 symptoms have been described, yet all the symptoms are still not entirely understood [20]. In a previous meta-analysis, Joli et al. found that the most typical manifestations of long COVID-19 were sleeplessness, extended breath, appetite loss, shortness of breath, and physical impairment [8]. However, our results show that difficulty thinking and concentrating, tiredness, sleep problems, headache, and cough were the most typical symptoms (with a prevalence of more than 40%). This study also described the association between post-COVID-19 symptoms and quality of life, considering age, ethnicity, marital status, income, COVID-19 experience, vaccination status, chronic disease history, and self-rated health. The quality of life of subjects post-COVID-19 was significantly influenced by the onset time of symptoms, possibly due to the gradual relief of mild symptoms [9]. Studies in Vietnam suggest comorbidities and chronic diseases are linked to health-related quality, as COVID-19 and chronic diseases have been linked to lower life quality [10]. The study's limitations include an online survey design, self-reported COVID-19 symptoms, and a limited sample size, necessitating further research with larger samples for validation.

## CONCLUSION

An online survey of Vietnamese students showed that 78.86% had post-COVID-19 symptoms, with neurological and respiratory issues being the most common. Anxiety significantly impacted their quality of life. Monitoring COVID-19 health consequences is crucial for patient care, public health, and policy development, and encouraging symptom reporting is essential for treatment development.

## AUTHOR CONTRIBUTIONS

DTC: Conception and design of the study; HVT, YVNT, LTT, QCB, and CHT: Data collection and data analysis; All author writing – original draft and reviewed final version of the manuscript.


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## CONFLICTS OF INTEREST

There is no conflict of interest among the authors.

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