

# Assessment of Insomnia and Associated Factors Among Patients Who Have Recovered from COVID-19 in Vietnam

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**Introduction:** The COVID-19 pandemic has been affecting the lives of millions of people globally. Patients recovering from COVID-19 are facing, not only the symptom of long COVID, but also psychological problems, such as sleep disturbance. This study aims to assess the proportion of COVID-19 recovered adult patients that suffer from insomnia and associated factors in Vietnam.

**Methods:** A cross-sectional study was performed between January and March 2022 among patients who have recovered from a COVID-19 infection. Data were collected based on a self-administered questionnaire that included sociodemographic and standardized questionnaires from the Hospital Anxiety and Depression Scale (HADS), the Perceived stress scale (PSS) and the dependent variable using Insomnia Severity Index (ISI). Multivariable logistic regression was conducted to explore factors associated with the patients' insomnia disorder.

**Results:** A total of 325 participants were included in this analysis, 34.5% of participants had insomnia. According to multivariable logistic regression, participants who were equal to and over 50 years of age, feeling alienated from others, and were not supported by families or relatives, reported significantly higher levels of insomnia disorders over those aged under 50 years, having closer ties with family and had received support from family or relatives. Besides, respondents who recorded mental health problems that included anxiety, depression and stress were more likely to get insomnia disorders than those without mental health symptoms (OR 2.7, 95% CI 1.1–6.6) (OR 4.5, 95% CI 2.3–8.9) (OR 2.3, 95% CI 1.1–5.3), respectively, all  $p < 0.05$ .

**Conclusion:** There was a remarkable rate of COVID-19 recovered patients experiencing insomnia disorders. Older age, alienated relationships and not being supported by families or relatives, as well as had mental health problems, are factors that affected the patients' insomnia, which showed that these sleep issues need to be screened and managed among adults who have recovered from COVID-19.

**Keywords:** COVID-19, insomnia, recovery, sleep disturbance, Vietnam

## Introduction

The severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2), a series of acute, atypical respiratory illnesses that are capable of infecting humans like SARS-CoV and MERS-CoV outbreak previously, caused the coronavirus disease 2019 (COVID-19) and was detected in China in late December 2019.<sup>1</sup> Since then, SARS-CoV-2 has rapidly evolved into a pandemic that posed a significant threat to public health and a high morbidity and mortality rate. As of 3 June 2022, over 529 million confirmed cases have been reported, while deaths are reported to be over 11.9 million globally.<sup>2</sup> Public health interventions, as well as immunization, were performed to help limit transmission and prevent serious illness and death.<sup>3</sup>

Nevertheless, the consequences of COVID-19 present an unprecedented challenge by patients recovering from COVID-19 who are faced with, not only the symptoms of long COVID (describe signs and symptoms which continue

after acute COVID-19 from 4 to 12 weeks), but also the psychological effects including anxiety disorders, depressive manifestations, sleep problems and others. These long-term psychiatric problems may, therefore, pose remarkable economic, healthcare and social burdens to the post-pandemic world.<sup>4,5</sup> Previously, patients who had recovered from the SARS and MERS infections reported that the long-term impact on mental health, especially psychiatric complications in SARS confirmed patients, could last over 2 years after recovery.<sup>6,7</sup> In the COVID-19 pandemic, Xu et al found that COVID-19 recovered patients had a remarkable rate of depression and insomnia, 9.92% and 26.45%, respectively.<sup>8</sup> This revealed the negative impacts of the COVID-19 pandemic on psychological problems as well as insomnia. Patients with mental health disorders who had high-risk factors were more likely to develop insomnia. By contrast, the high rate of insomnia is also related to psychological reactions.<sup>9</sup> Therefore, the early detection and proper intervention for insomnia and mental illness in the post-pandemic world holds great significance.

Insomnia is considered a widespread neuropsychological sleep-related disorder known to result in various issues including cognitive impairments, negative thoughts, emotional distress, and perceived sleep insufficiency, besides affecting the rate of other medical disorders.<sup>10</sup> Clinically, insomnia is considered one of the major psychiatric disorders in adolescents, including the main symptom being perceived sleep dissatisfaction, and difficulty in initiating or maintaining sleep.<sup>11,12</sup> Additionally, insomnia was commonly reported among various populations, not only in the acute phase of COVID-19 infection but also after recovery. Recently, Jahrami H's study found that the global rate of sleep problems among populations during COVID-19 was 35.7%, with the rates of health-care workers and the general population being 36.0% and 32.3%, respectively.<sup>13</sup> Patients with COVID-19 have a higher rate of sleep problems (74.8%).<sup>13</sup> Moreover, research has suggested that there is a reportable change in the proportion of sleep disturbances among COVID-19 patients during this pandemic, such as Jahrami et al (74.8%),<sup>13</sup> Deng et al (34%),<sup>14</sup> Goldstein et al (11%),<sup>15</sup> Huang et al (26%).<sup>16</sup> Also, COVID-19 patients who had a higher incidence of hospital-acquired infection are more susceptible to developing mental disorders and an increased need for admission in ICU care.<sup>17</sup>

The adverse impact of the coronavirus disease 2019 (COVID-19) pandemic on sleep problems in the global population shows the need for urgent attention to this problem, especially the long-term implications on survivors from COVID-19 need to be determined.<sup>18,19</sup> Several studies have revealed that proper sleep not only reduces the hazardous effects of non-communicable diseases (NCDs) but also leads to enhanced immunity to reduce the possible contraction of the COVID-19 infection.<sup>20,21</sup> Moreover, sleep becomes more essential in the pandemic because the lack of sleep could impair psychological functioning and decision-making leading to mood changes and individuals becoming more susceptible to disease.<sup>22</sup> Despite the importance of managing sleep disturbances in COVID recovered patients, detailed data in this area is currently lacking and unclear. Therefore, this study aims to assess the proportion of insomnia and associated factors among adults who have recovered from COVID-19 in Vietnam to evaluate the impact of COVID-19 on patients' mental health, as well as implement interventions by prioritizing screening and treatment in these subjects.

## Methods

### Study Design and Participants

A cross-sectional study targeted a sample of patients who have recovered from COVID-19 who had a checkup in two hospitals at Ho Chi Minh City (HCMC), Vietnam between January 24th and March 7th 2022. All patients were conveniently selected for the survey. They agreed to be involved and signed informed consent before their enrollment. They were able to withdraw from the survey at any time and all personal information was kept confidential. After the study, patients who showed any mental health problems were offered further evaluation by a psychiatrist if so desired.

### Inclusion and Exclusion Criteria

The inclusion criteria consisted of patients who (1) were aged  $\geq 18$  years (2) infected with the virus that causes COVID-19 at least 4 weeks after infection (confirmed by COVID-19 rapid antigen tests or real-time reverse transcription-polymerase chain reaction tests) and (3) agreed to partake in the study. Participants with any severe conditions that prevented them from participating in this study were excluded, including such conditions as impaired consciousness,

dementia, had prior history of any psychotic disorders or insomnia problems or did not complete the questionnaire were excluded.

## Data Collection

A self-administered questionnaire was used to collect data, which included 4 parts: (1) sociodemographic information included questions about age, gender, educational level, occupation, marital status, socioeconomic status, history of chronic medical illness, living condition, COVID-19 vaccine status, relationship in families, family/relative support; (2) the Hospital Anxiety and Depression Scale (HADS) included 14 items, divided into two subscales containing 7 questions each to evaluate anxiety and depression. Each item is used a 4-point scale (0–3 scores) and the cut-off points for anxiety and depression have a total score of 8 points.<sup>23,24</sup> (3) the 10-item Perceived Stress Scale (PSS) is validated and widely used to assess stress perception in patients. Responses to each question are used a 5-point Likert scale from 0 (never) to 4 (very often). However, items 4, 5, 7, and 8 were reverse scored. The total scores range from 0 to 40. The HADS and PSS indicated a high reliability with a Cronbach's  $\alpha$  being 0.85 and 0.72, respectively. The threshold used to consider the stress of a patient is when the score is  $\geq 13$ .<sup>25</sup> (4) the dependent variable was measured by the Insomnia Severity Index (ISI).<sup>26,27</sup> The scale consisted of 7 items to measure the perceived severity of nocturnal and daytime symptoms of insomnia during the previous 2 weeks. The reliability of the scale in our study was high, with a Cronbach's  $\alpha = 0.90$ . Each item is used a 5-point Likert scale, yielding a total score ranging from 0 to 28. The cut-off score for diagnosing insomnia disorder is  $\geq 8$  while the absence of insomnia scored in the range from 0 to 7.<sup>26</sup> The total score of insomnia disorder is categorized as follows; mild insomnia (8–14), moderate insomnia (15–21), and severe insomnia (22–28).<sup>27</sup>

## Statistical Analysis

All data were analyzed with Stata statistics version 14. Descriptive statistics used frequency and percentages or mean and standard deviations to analyze response to questions. Chi-square tests or Fisher's exact tests were analyzed for categorical variables to explore the potential factors associated with insomnia and all items with a p-value of 0.2 or less were entered into the multivariable logistic regressions. All  $p < 0.05$  was considered statistically significant. The model fitness was assessed by the Hosmer-Lemeshow test ( $\chi^2 = 8.7$ , 8 degrees of freedom,  $p = 0.371$ ) and indicated that its fit was satisfactory. Multicollinearity of the independent variables was assessed by using Variance Inflation Factor (VIF) and the mean VIF was 1.41.

## Ethic

All participants signed an informed consent before participating in the survey. Our survey was complied with the Declaration of Helsinki as well as the approval of the Ethics Committee at the University of Medicine and Pharmacy at Ho Chi Minh City, Vietnam (number: 108/UMP-BOARD).

## Results

A total of 325 patients who met all participation criteria and completed the questionnaire were included in the survey. Table 1 presents the sociodemographic characteristics of the sample. The sample mainly comprised participants who were female (61.8%), the mean of age was 37.5 ( $\pm 11.9$ ), aged under 50 years (70.5%) and were married (62.5%). More than one-third of the participants were officers/sellers (40.3%), had chronic conditions (32.6%) and had high school and higher education (45.6%). The majority of patients had socioeconomic status in the middle level (81.5%), living with family or others (94.1%), were fully COVID-19 vaccinated (89.2%), had close relationships with family (92.6%) and received family or relative support (94.2%). There were under one-fourth of participants who reported anxiety (20.3%) and stress (23.4%) while a total of 30.8% of patients had depression.

Figure 1 shows the proportion of participants who had an insomnia disorder ( $ISI \geq 8$ ) and categorized the level of insomnia disorder, including the absence of insomnia (0–7), mild insomnia (8–14), moderate insomnia (15–21), and severe insomnia (22–28). There was approximately one-third of respondents who had insomnia symptoms (34.5%) categorized as mild, moderate or severe symptoms of insomnia, which were recorded as 18.2%, 12.6% and 3.7%, respectively.

**Table I** Participants' Characteristics (N = 325)

Variables	N (%)
Age (years) (Mean±SD) (Min-Max)	37.5±11.9 (18–76)
Age groups	
<50	229(70.5)
≥50	96 (29.5)
Gender	
Male	124 (38.2)
Female	201 (61.8)
Education level	
Primary	77 (23.7)
Secondary	100 (30.7)
High school and higher	148 (45.6)
Occupation	
Blue-collar workers	94 (28.9)
Officer/Seller	131 (40.3)
Housewives/Retired	100 (30.8)
Marital status	
Married	203 (62.5)
Single/Widowed/ Divorced	122 (37.5)
Socioeconomic status	
Low	39 (12.0)
Middle	265 (81.5)
High	21 (6.5)
Chronic medical illness (Yes)	106(32.6)
Living situation	
Alone	19 (5.9)
With family or others	306 (94.1)
Having COVID-19 vaccine (n=504)	
Partly	33 (10.8)
Fully	274 (89.2)
Relationships in families	
Closeness	301 (92.6)
Alienation	24 (7.4)

(Continued)

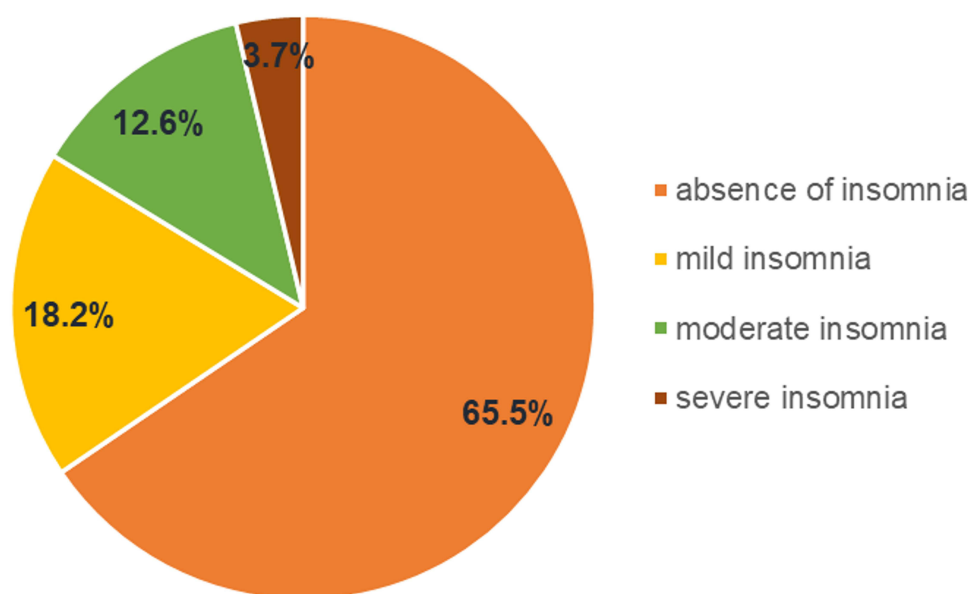
**Table 1** (Continued).

Family or relative support (Yes)	306 (94.2)
Mental health (Yes)	
Anxiety ( $\geq 8$ )	66 (20.3)
Depression ( $\geq 8$ )	100 (30.8)
Stress ( $\geq 13$ )	76 (23.4)

**Table 2** indicates the associated factors between demographics and insomnia. There shows a relationship between insomnia disorders and age, occupation, relationships in families and the support of families or relatives (all  $p < 0.05$ ). The association between mental health and insomnia is presented in **Table 3** which shows that anxiety, depression and stress were related to insomnia disorders (all  $p < 0.001$ ). The factors associated with insomnia in the multivariate logistic regression analysis are reported in **Table 4**. Participants who were equal to or over 50 years of age, reported feeling alienated from others and were not supported by family or relatives reported significantly higher levels of insomnia disorders than those aged under 50 years, who had closer connections with family and received support from family and relatives (OR 2.8, 95% CI 1.4–5.7), (OR 4.1, 95% CI 1.1–15.7), (OR 3.9, 95% CI 1.2–13.2), respectively, all  $p < 0.05$ . Besides, respondents who indicated they had anxiety (20.3%), depression (30.8%) and stress (23.4%) were more likely to report an insomnia disorder than those without any mental health symptoms (OR 2.7, 95% CI 1.1–6.6) (OR 4.5, 95% CI 2.3–8.9) (OR 2.3, 95% CI 1.1–5.3), respectively, all  $p < 0.05$ .

## Discussion

Since the emergence of the COVID-19 pandemic, there have been serious and significant impacts on all aspects of life around the world. The effects of vaccines, therapeutics or public health strategies have contributed to controlling the spread of the disease. However, the burden of COVID-19 can be persistent on both physical and mental health and other medical complication in the short-term and long-term post recovery. Amongst these post recovery issues, sleep disorders were commonly reported during the pandemic, not only in the acute phase of COVID-19 infection but also after recovery, which lead to having continuing issues on the survivors' life. Therefore, this study aims to explore the prevalence of

**Figure 1** Prevalence of insomnia.

**Table 2** Associated Factors Between Demographic and Insomnia (N = 325)

Variables	Patients with Insomnia Disorder N = 112, 34.5%	Patients without Insomnia Disorder N = 213, 65.5%	p*
Age (years)			
<50	48 (42.9)	181 (84.9)	<0.001
≥50	64 (57.1)	32 (15.1)	
Gender			
Male	36 (32.1)	88 (41.3)	0.106
Female	76 (67.9)	125 (58.7)	
Education status			
Primary	32 (28.6)	45 (21.1)	0.324
Secondary	32 (28.6)	68 (31.9)	
High school and higher	48 (42.8)	100 (47.0)	
Occupation			
Blue-collar workers	21 (18.8)	73 (34.3)	0.006
Officer/Seller	47 (41.9)	84 (39.4)	
Housewives/Retired	44 (39.3)	56 (26.3)	
Marital status			
Married	66 (58.9)	137 (64.3)	0.340
Single/Widowed/ Divorced	46 (41.1)	76 (35.7)	
Socioeconomic status			
Low	16 (14.3)	23 (10.8)	0.228
Middle	92 (82.1)	173 (81.2)	
High	4 (3.6)	17 (8.0)	
Chronic medical illness			
Yes	39 (34.8)	67 (31.5)	0.538
No	73 (65.2)	146 (68.5)	
Living situation			
Alone	9 (8.0)	10 (4.7)	0.222
With family or others	103 (92.0)	203 (95.3)	
Having COVID-19 vaccine (n=504)			
Partly	96 (90.6)	178 (88.6)	0.589
Full	10 (9.4)	23 (11.4)	

(Continued)

**Table 2** (Continued).

Variables	Patients with Insomnia Disorder N = 112, 34.5%	Patients without Insomnia Disorder N = 213, 65.5%	p*
Relationships in families			
Closeness	93 (83.0)	208 (97.7)	<0.001
Alienation	19 (17.0)	5 (2.4)	
Family or relative support			
Yes	101 (90.2)	205 (96.2)	0.027
No	11 (9.8)	8 (3.8)	

**Note:** \*Chi-square tests were used to analysis.

**Table 3** Associated Factors Between Mental Health and Insomnia (N = 325)

Variables	Patients with Insomnia Disorder N=112, 34.5%	Patients without Insomnia Disorder N=213, 65.5%	p*
Anxiety			
Yes (≥8)	53 (47.3)	13 (6.1)	<0.001
No (<8)	59 (52.7)	200 (93.9)	
Depression			
Yes (≥8)	70 (62.5)	30 (14.1)	<0.001
No (<8)	42 (37.5)	183 (85.9)	
Stress			
Yes (≥13)	54 (48.2)	22 (10.3)	<0.001
No (<13)	58 (51.8)	191 (89.7)	

**Note:** \*Chi-square tests were used to analysis.

insomnia among COVID-19 patients post recovery and associated factors in the context of the global health crisis as this challenge continues worldwide.

These results revealed that approximately one-third of participants had insomnia symptoms (34.5%) with the majority of them having symptoms from mild to moderate (18.2% and 12.6%, respectively). The levels observed in this investigation are far below those previously observed rates of insomnia among COVID-19 inpatients, or those discharged and examined one-month after hospital treatment. These groups reported an insomnia range from 42.8% to 74.8%.<sup>13,28–30</sup> Moreover, our findings are lower than the results in the umbrella review that found approximately 36.36% of health-care workers had insomnia during the COVID-19.<sup>31</sup> A possible explanation for this might be that poor sleep is linked to susceptibility to infection and a worsening clinical course among patients. In the acute phase, the patients seem to be fearful and anxious about social isolation procedures, as well as mandatory lockdowns, which combined, seem to cause an incidence of sleep disturbance in the population.<sup>13,32,33</sup> Owing to the fact of long-term social isolation during this time, COVID-19 patients' suicidal ideation and suicide attempts also increased accordingly.<sup>34</sup> Besides, COVID-19 patients who require intensive care at a specialist hospital (ICU) could potentially become a high-risk group for developing psychiatric disorders.<sup>35</sup> Since proper sleep plays a crucial role in accelerating patient recovery to enhance

**Table 4** Multivariable Logistic Regression Analysis Between Demographic and Insomnia (N = 325)

Variables	Insomnia Disorder	
	OR (95% CI)	p
Age (years) (Ref: <50 years)	2.8 (1.4–5.7)	0.003
Gender (Ref Male)	1.1 (0.6–2.1)	0.802
Occupation		
Blue-collar workers	Ref	
Officer/Seller	1.2 (0.5–2.6)	0.658
Housewives/Retired	1.6 (0.7–3.6)	0.295
Relationships in families (Ref: Closeness)	4.1 (1.1–15.7)	0.041
Family or relative support (Ref Yes)	3.9 (1.2–13.2)	0.025
Anxiety (Ref No)	2.7 (1.1–6.6)	0.034
Depression (Ref No)	4.5 (2.3–8.9)	<0.001
Stress (Ref No)	2.3 (1.1–5.3)	0.039

Note: Adjust R<sup>2</sup> = 33.2%.

immunity to protect against different viral infections, it is crucial that health professionals screen for and treat insomnia among survivors from COVID-19 to improve both normal sleep patterns and the mental health of these people.

Other findings showed that patients who were equal to or over 50 years of age were more likely to have insomnia than those under 50 years of age. This finding is consistent with that of previous studies<sup>29,36</sup> but contrary to Wang et al, which suggested that younger age sufferers had a risk factor for having an insomnia disorder.<sup>28</sup> This finding may be explained by the fact that the majority of COVID-19-related deaths were older adults who had a high risk of insomnia.<sup>37,38</sup> After the outbreak of COVID-19, older patients were greatly affected, not only physically but also mentally. They were faced with multiple pressures such as reinfection, property loss and potential death so were more prone to suffer from insomnia. Interestingly, our findings found that participants feeling alienated from others and who were not supported by family or relatives reported a higher rate of developing insomnia symptoms. These results are in line with those of previous studies that indicated that people who have a supportive social and psychological network from family or relatives had a lower risk of insomnia.<sup>36,39</sup> This result may be explained by the lack of contact with family and loved ones during quarantine or hospitalization, which is consistent with the previous assertion that social isolation and loneliness are linked to poor mental health outcomes.<sup>19</sup> As a result, social support is an important resource related to one's mental well-being, which contributes to mitigating the negative life experiences, especially in the scenario of the current pandemic.

A positive association between mental health and insomnia disorder was observed in this study. Consistent with the previous study, a higher level of anxiety, depression and stress in patients was more likely to also report insomnia problems.<sup>28–30,40,41</sup> From this, and similar to the SARS epidemic, psychiatric complications of infected patients can last for more than 2 years, and the medical costs of hospitalized patients with psychiatric comorbidities have increased greatly, which is causing a heavy economic burden to the individuals, families and society as a whole.<sup>7,42</sup> Thus, psychological health plays an important role in the rehabilitation process of COVID-19 patients. It appears to be necessary to simultaneously address sleep problems and psychological distress during the recovery phase of patients infected with the COVID-19.

Several limitations should be considered in this study. First, the research convenience involved patients attending a checkup at two hospitals in HCMC, which may result in a limitation or a generalization of the current results. Second, the cross-sectional design may leave open the possibility of not determining the cause-effect relationships between



insomnia and sociodemographics, and mental health issues, as well as evaluating the rate of insomnia problems in the past. However, our results have contributed to implementing interventions for surviving patients after they have recovered from COVID-19.

## Implications

The study emphasizes the importance of strategies to assist patients who recovered from COVID-19 in overcoming not only sleep problems but also the mental health of these people. Future research should focus on information relating to sleep issues to understand the changes in sleep caused by COVID-19.

## Conclusion

This study found a remarkable rate of COVID-19 recovered patients experiencing insomnia problems, and these reported sleep disturbances were affected by a range of different domains including older age, alienated relationships and not being supported by family or relatives, as well as mental health problems. Government and health-care providers need to design and implement appropriate psychological strategies and treatments to assist patients recovering from COVID-19.

## Data Sharing Statement

Data relating to this study are available from the first author upon request.

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## Author Contributions

All authors made a significant contribution to the work reported, whether that was in the conception, design of the study, execution, acquisition of data, analysis and interpretation, or in all these areas; took part in drafting, revising or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agreed to be accountable for all aspects of the work.

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## Disclosure

The authors report no conflicts of interest in this work.

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