PREVALENCE OF INSOMNIA AND ITS ASSOCIATION IN COVID-19-RECOVERED HEALTHCARE WORKERS IN SOME HOSPITALS OF VIETNAM

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Sleep problems in healthcare workers during the COVID-19 pandemic have been studied extensively. However, little is known about insomnia in COVID-19-recovered healthcare workers. This study aimed to explore the prevalence of insomnia and its related factors among healthcare workers after COVID-19 infection in Vietnam. A cross-sectional study was conducted among 212 healthcare workers who had recovered from COVID-19 within 6 months and did not require hospitalization. The results shown that 69.3% of the participants reported having insomnia with 19% reporting as severe. A third of the participants indicated that the quality, duration, and initiation of their sleep were worse than before COVID-19 infection. Participants suffering anxiety (OR 5.4 (2.5–11.6), p<0.001) or depressive (OR 4.1 (1.7–9.5), p=0.01) symptoms were substantially more likely to experience insomnia. Our study reported a high prevalence of insomnia among healthcare workers who recovered from COVID-19 infection. Healthcare workers who suffer from anxiety had significantly higher odds of experiencing insomnia than those without symptoms of anxiety and depression. Further interventions should be implemented for this group to alleviate these psychological problems.

Keywords: Post-COVID19, insomnia, healthcare worker, anxiety.

I. INTRODUCTION

Since the first COVID-19 case was diagnosed in 2019, more than 760 million people globally have been infected with this virus.[1] Healthcare workers have a higher risk of COVID-19 infection than the general population. Literature documented that a total of 152,888 healthcare workers around the world reported being infected with COVID-19.[2]

The COVID-19 crisis has negatively impacted healthcare workers' mental health not only during the pandemic but also post-COVID-19. Among the most prevalent bothersome symptoms in healthcare workers, insomnia was highlighted.[3] Several studies on insomnia in healthcare workers during the COVID-19 pandemic have been conducted. However, these studies did not specifically target healthcare workers who are positive or negative for COVID-19 or in the recovery phase.

The prevalence of insomnia among healthcare workers during the COVID-19 pandemic varied by region. Studies conducted in Jordan,[3] Israel,[4] and China[5] reported the prevalence of healthcare workers suffering from insomnia was 31.9%, 63%, and 51.7%, respectively. This percentage was nearly 74% in Vietnam.[6]

Previous studies have found insomnia-related factors in COVID-19-recovered patients, including older age, family support, alienated relationships, and comorbid diseases.[7] The negative association between insomnia and quality of life was documented in the prior study. In addition, other factors such as having no sick leave, increased working hours, being frontline healthcare workers, depression, and anxiety were illustrated as risk factors for insomnia among healthcare professionals.[6-8]

Sleep problems in healthcare workers during the COVID-19 pandemic have been studied extensively. However, little is known about insomnia in COVID-19-recovered healthcare workers. Healthcare workers who have been diagnosed with COVID-19 showed significantly higher odds of developing insomnia than those with COVID-19-negative.[8] Therefore, this study aimed to explore the prevalence of insomnia and its related factors among healthcare workers after COVID-19 infection in Vietnam. The findings of this study may help to understand about insomnia and suggest appropriate supports to manage this psychological problem in healthcare workers post-COVID-19.

II. METHODS

1. Study design

A cross-sectional survey was conducted in 4 large hospitals in Vietnam including: Vietduc University Hospital, Bach Mai Hospital, Hanoi Medical University Hospital, and Hoan My Hospital. Data was collected from July to September 2022.

2. Participants

Participants were healthcare workers who recovered from COVID-19 within 6 months (confirmed by Polemerase Chain Reaction test), and did not require hospitalization due to COVID-19 symptoms. Any participants with medical history of diagnosed insomnia and/or psychiatric disorder prior to infection (self-report) were excluded from the study.

3. Measurements

Insomnia

The Vietnamese version of the Insomnia Severity Index (ISI) was used to determine the insomnia severity among participants. The ISI contains seven items. Each question is given a 5-point Likert scale from 0 (no problem) to 4 (very severe problem), which yields a final score ranging from 0 to 28 for each participant, higher score indicating more severe insomnia level. A score of 10 and above indicated the participants had insomnia. This is the most optimal cut-off point to detect insomnia in the community allows (sensitivity: 86.2% and specificity: 87.7%).[9] Insomnia severity is interpreted as follows: mild insomnia (11–14), moderate insomnia (ISI score of 15–21) and severe insomnia (ISI score of 22–28). In the current study, the ISI had high reliability with Cronbach's Alpha = 0.91.

To compare the sleep quality, sleep initiation, and total sleep time before and after the COVID-19 infection, we also asked participants to rate the change in these sleep on a 3-point Likert-like scale (3 "worse/less than before," 2 "about the same," 1 "better/more than before").

Mental health

The Vietnamese version of Depression, Anxiety, and Stress Scale (DASS-14) was used to measure participants' mental health. DASS-14 is the short version of the DASS-

21. It is a self-report tool containing 14 items that measure the level of depression and anxiety in the preceding week of participation (7 items per subscale). Participants answered the items using a 4-point Likert scale ranging from 0 (Did not apply at all) to 3 (Applied very much, or most of the time). The total score was calculated by the sum of all items multiplied by two, ranging from 0 to 42 for each of the sub-scales. A cut-off point of 33 on each sub-scale was used to define participants with depressive/anxiety (sensitivity 79.1% and specificity 77.0%).[10] In this study, the internal consistency was reported to be high, with the overall scale having Cronbach's Alpha = 0.87, the depression subscale's Cronbach's Alpha = 0.82, and the anxiety subscale's Cronbach's Alpha = 0.85.

4. Sample size calculation and sampling method

Sample size calculation was based on the estimated prevalence of insomnia (50%) with a 3% margin of error. An estimated sample of 212 was suggested under the 95% confidence interval. The convenience sampling method was deployed in this study.

5. Ethics approval

The study was approved by the Nam Dinh Nursing University ethics committee (under the decision No 1580/GCN-HĐĐĐ). All participants in the study had been consulted and provided electronic informed consent.

6. Data collection

The questionnaire was created using Qualtrics CoreXM. An open invitation to participate was sent to doctors and nurses in the 4 hospitals. The invitation was sent to either email address or Facebook and Zalo account.

7. Data analysis

Data were cleaned and analyzed by Stata 15.0. Descriptive analysis was used. The Wilcoxon rank-sum, Pearsons' chi-squared tests and Fisher's exact tests were used to detect statistically significant differences between participants' characteristics. We used univariate and multivariable logistic regression to estimate odds ratios (ORs) and 95%CIs of the associations between insomnia and other variables. Age, gender and factors associated with insomnia at $p < 0.20$ in the bivariate logistic were selected in the multivariate logistic.

III. RESULTS

1. Participants' sociodemographic characteristics

The descriptive values of sociodemographic characteristics, COVID-19 infection, and mental health indicators are given in Table 1. With a mean age of 35.3, 69.3% of participants were married, 45.8% had a college education, and the majority of participants (77.4%) were female. In the clinical department, 67% of members practiced. 93.4% of participants recorded being symptomatic during their COVID-19 infection period and 99.1% of participants had no pre-existing chronic condition. By contrast, although these asymptomatic participants also scored higher on ISI (14.0, SD 5.8), there was no statistically significant difference between these two groups. Additionally, depression and anxiety's mean scores were 6.2 (SD 8.4) and 7.4 (SD 8.4), respectively. As a consequence, 55 (25.9%) participants had former symptoms, and 77 (36.3%) participants had latter symptoms. Participants' ISI scores were substantially higher for those with depressive symptoms (17.5, SD 6.5) and anxiety symptoms (17.6, SD 6.2) than for those without (12.8, SD 5.1 and 12.0, SD 4.5, respectively, $p < 0.001$).

Table 1. Participant's characteristics

	Total		ISI score		p-value [a]	Insomnia participants		p-value [b]
	n	%	Mean	SD		n	%	
N	212		13.8	3.1		147	69.3%	
Sociodemographic characteristics								
Gender					0.660			0.70
Male	47	22.2%	13.6	5.4		34	23%	
Female	164	77.4%	14.2	6.0		112	76%	
LGBT	1	0.5%	10.0	.		1	1%	
Age (Mean, SD)	35.30 (7.134)		--	--		33.5 (10.4)		
Marital status					0.427			0.17
Single	61	28.8%	14.1	5.3		46	31%	
Married	147	69.3%	14.0	6.0		97	66%	
Divorced/ Widowed	4	1.9%	17.8	7.1		4	3%	
Education level					0.637			0.35
Vocational	68	32.1%	13.6	5.8		45	31%	
University	97	45.8%	14.0	5.6		72	49%	
Post-graduate	47	22.2%	14.7	6.5		30	20%	
Faculties					0.810			0.11
Office Dep.	53	26%	14.3	6.7		13	11%	
COVID-19 treatment Dep.	13	6%	13.8	2.7		12	10%	
Clinical Dep.	137	67%	13.7	5.6		95	79%	

	Total		ISI score		p-value [a]	Insomnia participants		p-value [b]
	n	%	Mean	SD		n	%	
Pre-existing chronic condition					0.228			0.480
No	210	99.1%	14.0	5.9		145	99%	
Yes	2	0.9%	19.0	7.1		2	1%	
COVID-19 infection								
Having symptoms of COVID-19					0.902			0.860
No	14	6.6%	14.2	5.9		10	7%	
Yes	198	93.4%	14.0	5.9		137	93%	
Mental health indicators								
Depression score (Mean, SD)	6.18 (8.44)		--	--				
Depression level					<0.001			0.001
No depressive symptoms	157	74.1%	12.8	5.1		99	67%	
With depressive symptoms	55	25.9%	17.6	6.6		48	33%	
Anxiety score (Mean, SD)	7.35 (8.36)		--	--				
Anxiety level					<0.001			<0.001
No anxiety symptoms	135	63.7%	12.0	4.5		79	54%	
With anxiety symptoms	77	36.3%	17.6	6.2		68	46%	

[a]P-value was calculated to differentiate between ISI score of different sociodemographic characteristics, COVID-19 infection, and mental health indicators.

[b]P-value was calculated to differentiate between insomnia status (Yes/No) of different sociodemographic characteristics, COVID-19 infection, and mental health indicators.

2. Insomnia

The ISI score and stratification by insomnia status were recorded by 212 participants who were healthcare workers in Vietnam. The average ISI score was 13.8 ± 3.1.

69.3% of the participants (147 out of 212) reported having insomnia. Of those who reported having insomnia, 40.1% reported as mild, 40.8% reported as moderate, and 19% reported as severe. The characteristics of insomnia participants were comparable to those of the entire group. Furthermore, participants with and without sleeplessness had significantly different levels of anxiety and depression (p<0.001). Figure 1 depicts the evaluation of sleep quality by participants following the COVID-19 infection. A third of the participants indicated that the quality, duration, and initiation of their sleep were worse than before being COVID-19 infected. Similarly, after recovering from COVID-19, 36.3% of participants spent more nights staying awake compared to prior to infection.
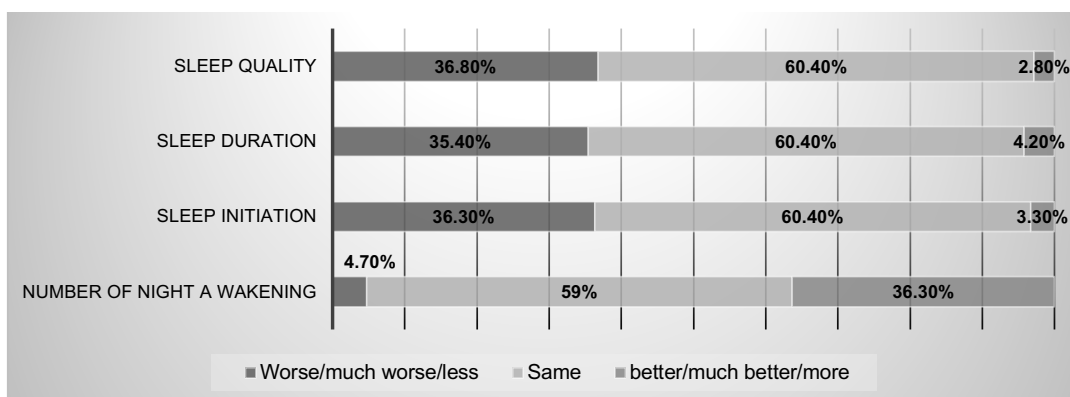

Figure 1. Subjective assessment of sleep parameters after COVID-19 infection of 212 participants

3. Factor associated with insomnia

Table 2 illustrates the results of univariate and multivariable logistic regression, identifying the factors associated with the prevalence of insomnia in 212 participants infected with COVID-19. The univariate regression analysis revealed that clinical workers, university education, married and female had no significantly higher odds of experiencing insomnia compared to office workers, single, male, or had formal education.

Regarding the COVID-19 infection, there was no significant difference in the probability of experiencing insomnia following the infection, being a symptomatic condition, or being a period of infection. Conversely, participants suffering anxiety (OR 5.4 (2.5–11.6), p<0.001) or depressive (OR 4.1 (1.7–9.5), p=0.01) symptoms were substantially more likely to experience insomnia than those without.

Table 2. Factors associated with the prevalence of insomnia

	Univariate analysis		Multivariable analysis	
	OR (95% CI)	p-value	OR (95% CI)	p-value
Sociodemographic characteristics				
Age	1.0 (0.937-1.0)	0.218	1.0 (0.9 - 1.0)	0.300
Gender				
Male	Ref		Ref	
Female	0.8 (0.4 – 1.7)	0.597	0.9 (0.4 - 2.0)	0.727
LGBT	--		--	
Marital status				
Single	Ref		Ref	
Married	0.6 (0.3 – 1.2)	0.184	0.9 (0.4 - 2.1)	0.726
Divorced/ Widowed	--	.	--	
Education level				
Formal education	Ref		--	
University	1.5 (0.7 – 2.9)	0.264	--	
Post-graduate	0.9 (0.4 – 2.0)	0.795	--	
Faculities				
Office Dep.	Ref		Ref	
Clinical Dep.	1.4 (0.7 - 2.7)	0.352	7.8 (0.9 - 69.8)	0.067
COVID-19 treatment Dep.	7.3 (0.9 - 60.2)	0.066	1.4 (0.7 - 2.9)	0.396
COVID-19 infection				
Having symptoms of COVID-19				
No	Ref		--	
Yes	0.9 (0.2 - 2.8)	0.861	--	
Mental health indicators				
Depression level				
No depressive symptoms	Ref		Ref	
With depressive symptoms	4.0 (1.7 - 9.5)	**0.01**	1.8 (0.6 - 5.0)	0.290
Anxiety level				
No anxiety symptoms	Ref		Ref	
With anxiety symptoms	5.4 (2.5 - 11.6)	**<0.001**	3.9 (1.6 - 9.7)	**0.003**

Note. Models were estimated by univariate and multivariable logistic regression to examine the association with the prevalence of insomnia.

There is a non-significant correlation between gender, marital status, education level, having COVID-19 symptoms, and the frequency of sleeplessness, as validated by the multivariable regression. As for this model, participants with anxiety symptoms had significantly greater odds of having insomnia (OR 3.9 (1.6–9.7)) compared to those without. Furthermore, these associations were stronger than in the univariate model, yet there were non-significant odds of having insomnia in participants with depression.

IV. DISCUSSION

The findings from the present study illustrated that healthcare workers in the post-COVID-19 recovery phase experienced a high prevalence of insomnia at 69.3% which is similar with previous studies. Among these insomnia patients, there were 40.1% with mild symptoms, and the rest with moderate and severe symptoms. In addition, approximately 35% of our participants rated their sleep such as sleep quality, sleep duration, and sleep initiation as worsen than before. Insomnia is one of the top most common symptoms of post COVID-19 condition which can last from weeks to months. Similarly, previous studies also reported that the prevalence of insomnia in the COVID-19 survivors was as high as 63.12% in China [11] and 76.1% in Vietnam. [7] Inflammation of the nervous system and endocrine disorders caused by Covid-19 may contribute to sleep disorders in recovered Covid-19 patients.[11] Insomnia after COVID-19 has been seen not only in healthcare workers but also in non-healthcare professionals.[7] However, compared to the general population, healthcare providers developed more sleep disorders during the crisis of COVID-19.[12] Therefore, awareness of COVID-19-related insomnia among healthcare workers is essential, and clinical trials to manage this problem were proposed such as psychoeducational, mindfulness-based mental mobile health intervention.[13]

Data from bivariate and multivariate regression logistic illustrated that healthcare workers with symptoms of anxiety and depression were more likely to have insomnia compared to those people without anxiety and depression. In line with this findings, other studies also reported that anxiety and depression were risk factors for insomnia in healthcare workers.[7] In fact, anxiety and depression disorders were prevalent in health professionals both during and after the COVID-19 pandemic.[14] During the pandemic, the prevalence ranged between 22.1% - 79% for anxiety and 21.7% - 76.93% for depression in healthcare workers.[15,16] This prevalence remains high post-pandemic. Namely, a survey in China reported that the proportion of depression and anxiety was 34.7 and 59.6, respectively.[17] Our study showed that 25.9% of healthcare workers had depression, amongst them 36.3% also had anxiety. Thus, promoting the mental health of COVID-19 survivors may be an effective method to mitigate insomnia symptoms. The effects of non-pharmaceutical interventions such as Yoga or music therapy to reduce anxiety, depression, and insomnia in healthcare providers have been confirmed. [18]

Unlike the results reported from existing studies,[7,11] this study found none of the sociodemographic factors significantly associated with insomnia in healthcare workers who recovered from COVID-19 infection. Lu and colleagues (2024) found that people who are over than 18 years old, with a junior high school diploma or below were more likely to suffer insomnia than those who are younger than 18 with high school or above. Hoang et al (2023) indicated that having pre-existing condition and holding bachelor degree were

risk factors of insomnia in COVID-19 survivors. In addition, during the COVID-19 outbreak, female healthcare workers had a higher risk of insomnia than men, which is contradicting this study.[19,20]

Moreover, a previous study reported that frontline health care workers who working directly with COVID-19 patients had a higher risk of insomnia,[21] while this study found that there was no significant difference in developing insomnia between COVID-19 department staff and other departments' staff. It could be explained that this study was conducted, the COVID-19 pandemic situation in Vietnam was more controlled. Patient with COVID-19 infection was not only treated at the COVID ward but also in other wards with isolation rooms and treatment protocols. As such, the burnout syndrome in medical staff working in the COVID-19 department may be reduced, while a positive association between insomnia and burnout was confirmed.

To our knowledge, this is the first study in Vietnam to assess insomnia among healthcare workers who have recovered from COVID-19 infection, which was seen as the strength of this study. However, there are some limitations in this study. Firstly, this study did not investigate possible factor that may influence insomnia such as specific occupation of the healthcare workers, and working experience. Nurses and fewer years of working experience are risk factors of developing insomnia, which has been emphasized in a systematic review. Secondly, some associated factors such as resilience, health literacy, organizational supports, and physical activity may protect healthcare workers from insomnia have not been explored in this study. Thus, further studies may consider to include these mentioned variables in order to have a comprehensive view of insomnia among healthcare workers who have recovered from COVID-19. In addition, the use of the convenience sampling may cause subject selection bias.

V. CONCLUSION

The prevalence rate of insomnia among healthcare workers who recovered from COVID-19 was high. Healthcare workers who suffer from anxietyhad significantly higher odds of experiencing insomnia than those without symptoms of anxiety and depression. Further interventions should be implemented for this group of people to alleviate these psychological problems.

Conflict of interest

No potential conflict of interest relevant to this article was reported.

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