POST-TRAUMATIC STRESS DISORDERS DUE TO COVID-19 PANDEMIC ON HEALTHCARE WORKERS IN SOME HOSPITALS IN HANOI, 2021

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The COVID-19 pandemic has affected many healthcare workers' physical and mental health. This study was conducted to identify the prevalence of post-traumatic stress disorders due to the COVID-19 pandemic among healthcare workers and analyze some associated factors in 2021. A cross-sectional study was carried out to collect data from 470 participants who are healthcare workers at different hospitals in Hanoi, including Hanoi Medical University Hospital, Dong Da Hospital, and Thanh Nhan Hospital. The Impact of Event Scale-Revised was used to analyze how the COVID-19 pandemic impacted the post-traumatic stress disorders of healthcare workers. The results of the study showed that the prevalence of post-traumatic stress disorders due to the COVID-19 pandemic among study participants was 28.09%. The healthcare worker with greater post-traumatic stress disorders was a person who works in Internal medicine, was a female, and worked long hours (more than 8 hours per day), with vaccination being a protective factor. It is recommended to support and improve preventive measures for occupational health workers.

Keywords: Post-traumatic stress disorders, healthcare workers, COVID-19, Hanoi.

I. INTRODUCTION

COVID-19 has resulted in a significant global death toll and posed numerous challenges to the mental well-being of many individuals. The COVID-19 pandemic has affected healthcare workers' physical and mental health.[1] Throughout the pandemic, healthcare workers (HCWs) played a vital role by providing direct care for some of the most severely affected patients.[2,3] It has been well-documented that HCWs have higher rates of mental health issues during the COVID-19 pandemic.[4] A study in Spain conducted on 1422 HCWs reported that the rate of HCWs with Post-traumatic stress disorders (PTSD) was 58.8%, the risk variables for PRSD would be a person who is a woman, employed at a hospital, concern that family members and/or someone with whom they are living with may be infected, and concern over becoming infected. In contrast to the situation in some countries where the COVID-19 pandemic has spread uncontrollably, the impacts of the pandemic in Vietnam have been minimized through proactive interventions such as early detection, timely isolation, and strict adherence to social distancing measures. Vietnam has temporarily controlled the spread of the disease quite well.

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The role of healthcare volunteers and ensuring the healthcare staff's physical and mental safety has been significant, and this has led to ensuring the sustainability of our healthcare system in the years to come.[5] As of March 15, 2023, according to the Vietnamese Ministry of Health's statistics, the total number of infected people was 11,527,054 and the number of deaths due to COVID-19 was 43,186. [6]In particular, Hanoi, the capital city, was one of the five cities/provinces with the highest number of COVID-19 cases in the fourth wave of the COVID-19 pandemic in Vietnam. The question was how the COVID-19 pandemic has affected to the mental health status of healthcare workers who actively engaged in COVID-19 prevention and control efforts and what factors were associated with this condition. Therefore, we conducted this study to estimate the prevalence of and analyze some associated factors of post-traumatic stress disorders due to the COVID-19 pandemic on healthcare workers who actively involved in COVID-19 prevention and control in some hospitals in Hanoi in 2021.

II. METHODS

1. Study subjects

The research subjects are HCWs who have been participating in COVID-19 prevention and control activities at some hospitals in Hanoi city, including Hanoi Medical University Hospital, Dong Da Hospital, and Thanh Nhan Hospital, 2021.

Inclusion criteria: HCWs were directly involved in daily patient examination, treatment, and care. HCWs who have worked at the hospitals for at least 6 months. HCWs who agreed verbally to participate in the study.

Exclusion criteria: HCWs who were COVID-19 patients. HCWs who were absent during the study implementation (on leave, to study, or on maternity +leave).

2. Study methods

Study design

A cross–sectional study was used.

Study time

The study time was 2021 to 2023, in which, the data collection took place during the final quarter of 2021.

Sample size and sampling

In this study, the sample size for estimating a population proportion was used:

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

In which:

n: Minimum study sample size

p = 0.175 (the proportion of PTSD in health care staff at some hospitals in the North of Vietnam during the COVID-19 pandemic)[7]

$Z_{1-\alpha/2}$: The critical value of the normal distribution (is 1.96 with a confidence level of 95%, α = 0.05)

d: absolute error (d = 0.04)

Therefore, the minimum study sample size was n = 347. In fact, we recruited 470 healthcare workers in the study.

A purposive sampling method was employed to recruit participants for this study. All healthcare workers assigned to the medical examination, emergency department, internal medicine department, intensive care unit, and infectious diseases department across 3 hospitals (Hanoi Medical University Hospital, Dong Da Hospital, Thanh Nhan Hospital) were selected at the time of data collection. There are 186 HCWs at Thanh Nhan hospital, 225 HCWs at Dong Da hospital, and 59 HCWs at Hanoi Medical University hospital.

Study variables and indicators

Independent variables: demographic characteristics (gender, age groups, marital status, living alone, and education level), Occupational characteristics (job type, number of working years, and department), COVID-19 related (working in COVID-19 prevention, contact with positive cases, daily working hours last week, daily working hours during the COVID-19 outbreak, and the number of vaccine doses administered against COVID-19).

Dependent variables: Post-traumatic stress disorders were defined as an individual's score of 22 items IES-R. Each question was rated on a 5-point Likert scale, with responses ranging from 0 (Not at all) to 4 (Extremely), ranges from 0 to 88, and the cut-off point score for diagnosis PTSD was set as more than or equal to 33, with a higher score indicating more serious PTSD symptoms.[8] The IES-R scale has been validated to measure levels of PTSD and has demonstrated high internal consistency for the total scale (Cronbach's alpha=0.96) in a sample of Vietnam veterans.

Data collection tools and techniques

Data collection techniques: Self-administered interviews were applied to collect data, emphasizing the preservation of confidentiality and objectivity. Participation in the research was entirely voluntary. Lastly, the research team reviewed and checked to ensure completeness and accuracy then asked the participants to add missing or inaccurate information.

Data collection tools: The self-administered questionnaire consisted of two parts

- Part 1: We included questions to measure demographic, occupational, and COVID-19-related characteristics.

- Part 2: Information regarding the impact of COVID-19. Using specific parts of the 22-item Impact of Event Scale-Revised (IES-R). The Impact of Event Scale-Revised is probably the most widely used self-report measure in the field of traumatic stress. Items are rated on a 5-point scale ranging from 0 ("*not at all*") to 4 ("*extremely*").

Data management and analysis

The data was entered and cleaned using Epidata 3.1 and STATA 15.0 software. Descriptive statistics wereutilized, including mean deviation, median, and standard deviation for quantitative variables, as well as proportions and ratios for categorical variables. A univariate logistic regression model was selected to determine the odds ratio (OR) and the 95%CI. The multivariate logistic regression model was performed to determine the adjusted odds ratio (aOR) on risk variables. Variables for the multivariate model were selected based on a combination of known risk factors for PTSD from existing literature, and variables significantly associated with PTSD in the univariable analyses. Statistical significance was defined at a p-value of less than 0.05

Ethical considerations

Participants were explained clearly about the purpose of the study. The implementation of the study does not affect the health and other benefits of the participants. The data were for research purposes only. Results are published in general, without providing personally identifiable information. The study was ethically officially approved by the Ministry of Health dated 19 January 2021 (Number 377/QD-BYT)

III. RESULTS

Table 1. The demographic characteristics of study participants

Variables (n=470)		Frequencies (n)	Percentages (%)
Gender	Male	127	27.02
	Female	343	72.98
Age group	18 – 25 years	23	4.89
	26 – 30 years	88	18.72
	31 – 40 years	230	48.93
	> 40 years	129	27.44
	Mean ± SD (min-max)	36.18 ± 7.42 (24-62)	
Marital status	Single/Separated/Widowed	118	25.11
	Married	352	74.89
Living alone	Yes	24	5.11
	No	446	94.89
Education levels	Lower than college/university	29	6.17
	College/University	394	83.83
	Higher than college/university	47	10.00

The study consisted mostly of females, accounting for 72.98% of the participants, while males made up a smaller portion at 37.02%. On average, the participants' age was 36.18±7.42 years old, and nearly half of them fell between the age range of 31-40 years old (48.93%). Participants aged 40 years or older constituted a significantly larger group (27.44%) compared to those aged 18-25 years old (4.89%). In terms of marital status, approximately three-quarters of the participants were married (74.89%), while the remaining participants were single, separated, or widowed (25.11%). The findings indicated that the majority of participants (94.89%) reported living alone. Furthermore, a proportion of the participants had completed college/university education (83.83%), while a smaller percentage held higher than college/university (10.00%).

Table 2. Occupational characteristics of study participants

Variables (n = 470)		Frequencies (n)	Percentages (%)
Job types	Doctor	147	31.28
	Nurse	317	67.45
	Others (technicians, nursing assistants)	6	1.28

	Variables (n = 470)	Frequencies (n)	Percentages (%)
Working year groups	1- 5 years	161	34.26
	6 – 10 years	145	30.85
	11 – 15 years	79	16.81
	16 – 20 years	42	8.94
	> 20 years	43	9.15
	Mean ± SD (min-max)	9.61 ± 7.14 (1-34)	
Working Departments	Medical Examination	95	20.21
	Emergency	71	15.11
	Internal medicine	85	18.09
	Intensive care unit	105	22.34
	Infectious diseases	58	12.34
	Others (surgery, diagnostic imaging…)	56	11.91
Working in the COVID-19 prevention	Yes	424	90.21
	No	46	9.79
Contact with positive cases	Yes	402	85.53
	No	68	14.47
Average number of daily working hours during the COVID-19	≤ 8h	196	41.70
	> 8h	274	58.30
	Mean ± SD (min-max)	10.42 ± 3.05 (3-20)	
Average number of daily working hours last week	≤ 8h	275	58.51
	> 8h	195	41.49
	Mean ± SD (min-max)	9.57 ± 2.62 (4-18)	
The number of vaccine doses administered	1 dose	5	1.06
	2 doses	438	93.19
	3 doses	27	5.74

According to the table, nurses made up the majority of participants in the study, with twice as many nurses as doctors. The distribution of participants based on working years showed no significant difference between the groups of 1-5 years and 6-10 years, which accounted for approximately 34.26% and 30.85% of the sample, respectively. The remaining two age

groups, 16-20 years and over 20 years, made up 8% and 9% of the sample, respectively. The highest percentage of HCWs were employed in the ICU department, comprising 22.34% of the participants. This was followed by the medical examination, internal medicine, and emergency departments, which accounted for 20.21%, 18.09%, and 15.11% respective.

The majority of study participants reported that they had worked in COVID-19 prevention 90.21% and had come into contact with individuals suspected of being positive for the virus 85.53%. The average working time of healthcare workers during the entire pandemic period was 10.42 ± 3.05, and the average working time of healthcare workers in the previous week was 9.57 ± 2.62. The majority of HCWs 93.19% received two doses of the vaccine, a small percentage 5.74% received three doses, and there were no reports of unvaccinated HCWs during the pandemic.

Table 3. PTSD among study participants through IES-R score

Classification	Frequency (n)	Percentage (%)
Less 33 points (No post-traumatic stress disorder)	338	71.91
From 33 points and above (Post-traumatic stress disorder present)	132	28.09
Total	470	100

The overall score of the PTSD scale, with a cut-off level of “33”, revealed that 132 out of 470 participants (28.09%) were positive for PTSD and 338 out of 470 participants (71.91%) were negative for PTSD.

Table 4. Association the impact of COVID-19 on PTSD healthcare workers in multivariate analysis

Factor		OR	95%CI		p-value	aOR	95%CI		p-value
			Lower	Upper			Lower	Upper	
Gender (male, ref.)		1.63	1.10	2.64	**0.04**	1.72	1.04	2.85	0.03
Age groups (18-25 years, ref.)	26-30	1.52	0.29	3.28	0.96	1.96	0.28	3.26	0.95
	31-40	2.16	0.71	6.59	0.17	2.21	0.71	6.88	0.16
	>40	2.21	0.70	6.92	0.17	2.28	0.70	7.43	0.17
Married status (married, ref.)		1.17	0.54	1.34	0.49	1.41	0.92	2.15	0.11
Living alone (no, ref.)		0.77	0.32	1.84	0.55	0.66	0.04	2.21	0.23

Factor		OR	95%CI		p-value	aOR	95%CI		p-value
			Lower	Upper			Lower	Upper	
Education (Higher than college/ university, ref.)	College/ University	1.45	0.69	3.01	0.31	1.61	0.76	3.39	0.21
Job type (doctor, ref.)		1.35	0.65	1.56	0.96	1.23	0.61	1.49	0.84
Working groups (1-5years, ref.)	6-10	1.51	0.90	2.52	0.11	1.52	0.90	2.54	0.11
	11-15	1.25	0.67	2.34	0.47	1.28	0.68	2.41	0.43
	16-20	1.73	0.82	3.64	0.14	1.78	0.84	3.78	0.13
	>20	1.15	4.64	2.27	0.02	1.12	0.99	1.33	0.15
Departments (Medical Examinaton, ref.)	Emergency/ ICU	1.10	0.60	2.00	0.74	1.06	0.68	2.41	0.43
	Internal Medicine	4.35	2.28	8.31	0.00	2.29	1.11	4.71	0.13
	Others	1.28	0.60	2.76	0.51	1.12	0.84	3.78	0.11
Working in the COVID-19 prevention (no, ref.)		1.45	0.69	3.02	0.31	1.30	0.93	3.54	0.22
Contact with positive cases (no, ref.)		1.86	1.16	3.17	0.02	1.58	0.88	2.88	0.12
The average number of daily working hours during the COVID-19 (≤ 8 hours, ref.)		2.39	1.54	3.71	0.00	2.62	1.47	4.68	0.01
The average number of daily working hours during last week (≤ 8 hours, ref.)		2.09	1.39	3.15	0.00	1.07	0.61	1.88	0.78
The number of vaccine doses administered (2 doses, ref.)	3 doses	0.22	0.07	0.67	0.00	0.23	0.07	0.72	0.01

Multivariable logistic regression analysis showed that several independent factors were associated with the incidence of PTSD in healthcare workers. The factors identified as increasing the risk of PTSD were gender and daily working hours during the pandemic. Female healthcare workers had a 1.72 times greater likelihood of developing PTSD than male healthcare workers (95% CI=1.04-2.85). Healthcare workers working more than 8 hours per day had a 2.62 times higher risk of PTSD than those working less than 8 hours per day (95%CI=1.47-2.68). Additionally, the number of vaccine doses was considered a protective factor for healthcare workers against the risk of PTSD. Receiving an additional vaccine dose reduced the risk of PTSD by 0.23 times (95% CI= 0.07-0.72).

IV. DISCUSSION

This study indicates significant evidence of PTSD among healthcare workers due to the impact of the COVID-19 pandemic.

Previous studies have shown a significant prevalence of (PTSD) among HCWs, indicating the severe impact of the pandemic on their mental health. The prevalence of PTSD in this study was 28.09% (132/470), which was lower than the rates found in heavily endemic countries, such as [9]China (37%), but is higher than in other Asian countries, such as Singapore (<20%) and India (<10%), during early stages of the COVID-19 pandemic. [10]A study in Spain conducted on 1422 HCWs reported that the rate of HCWs with PTSD was 58.8%, which is twice as high as the results of our study. The difference in the rate of HCWs with PTSD among studies might be due to the different contexts of the COVID-19 pandemic varied among countries.[7] In Vietnam, this study found a higher prevalence of PTSD among HCWs compared to a previous study conducted in the Northern region, which used the PSS-SR scale and reported a prevalence rate of 17.5%. It might be explained by different methods, and the timing of the survey. At the time of conducting this research, Vietnam was in the midst of the fourth wave of the COVID-19 pandemic, with a significant increase in cases and deaths. These results highlight the negative impact of the COVID-19 pandemic on the mental health of HCWs. It implies greater efforts and intervention to reduce the negative impacts of the pandemic on the HCWs.

Our research shows that female HCWs (OR=1.63, 95%CI=1.10-2.64) were more susceptible to developing PTSD compared to their male counterparts, this is entirely consistent with a study conducted by [11]as it is often the first stop for febrile patients who are subsequently diagnosed with coronavirus disease 2019. This study, which employed a cross-sectional design, aimed to assess the mental health of emergency department medical staff during the epidemic in China.\nMethods\nDemographic data and mental health measurements were collected by electronic questionnaires from February 28, 2020 to March 18, 2020.\nOutcomes\nA total of 14,825 doctors and nurses in 31 provinces of mainland China completed the survey. The prevalence rates of depressive symptoms and post-traumatic stress disorder (PTSDSong et al on 14,825 doctors and nurses, showing a higher prevalence of PTSD among females (OR=1.75, 95% CI=1.51-2.03).[12] These findings are consistent with broader trauma literature which suggests that the risk of PTSD was twice higher among females than males. Our findings suggest that intervention to reduce PTSD for HCWs should be prioritized for females. Furthermore, our study also indicated that healthcare workers in Internal Medicine were significantly more likely to experience PTSD (OR=4.35, 95%CI=2.28-8.31).[13] This result is

consistent with a study conducted in Vietnam by Thao et al. In fact, increasing pressure related to COVID-19 was distributed throughout the hospital system. Therefore, while it is important to provide appropriate support to departments with higher psychological needs, such as Internal Medicine, healthcare systems should be prepared to provide adequate support to all healthcare workers. HCWs working in hospitals for extended hours per week or during the COVID-19 pandemic are at risk of developing severe PTSD and mental distress. [14]Some studies have concluded a relationship between depression and mental anguish with long-term weekly working hours. An overload of work frequently imposes both physical and psychological strains on healthcare workers. The current results further illustrate the importance of reasonable work arrangements for the mental health of healthcare workers. The study also found that HCWs with more work experience reported experiencing PTSD. This suggests that the more experienced the HCWs, the less likely they are to report mentally distressing experiences, [15]which is consistent with previous research. A longer work tenure often means more clinical experience when faced with an epidemic, which may be conducive to stronger self-regulation ability. Our study found that completing the full course of vaccines (93.19% of HCWs have completed the second dose) can reduce PTSD symptoms among HCWs compared to those who have not received enough doses. This is a significant finding as vaccinating as many healthcare workers as possible can prevent infection spread and reduce critical workforce loss.

However, our study has some limitations. First, this was an analytical cross-sectional study that can only assess the impact at a specific point in time and cannot evaluate long-term effects, making it difficult to assess psychological sequelae and treatment needs. Second, as the questionnaire was self-reported, recall and other biases may cause certain answers to be underestimated or overestimated. Thirdly, our study only focuses on research conducted at hospitals without addressing other healthcare facilities and primarily targeting frontline workers involved in disease prevention and control, which may lead to a lack of objectivity and representation. Nevertheless, our data is sufficient to indicate the severity of PTSD that healthcare workers were experiencing and provide valuable insights for policy development.

V. CONCLUSION

COVID-19 has a great impact on the psychological health of healthcare workers in Vietnam, especially during the most severe wave in 2021. The prevalence of PTSD (based on IES-R) due to the COVID-19 pandemic on healthcare workers in Hanoi in 2021 was 28.09%. The profile of a healthcare worker with greater post-traumatic stress disorders would be a person who works in Internal medicine, is a female, and works long hours (> 8 hours per day), with vaccination being a protective factor. Therefore, greater endeavors are required to guarantee appropriate accessibility and sufficient delivery of psychological support to healthcare workers, particularly nurses, those working in high-intensity settings such as Internal Medicine and those who have direct responsibility for and interactions with COVID-19 patients.

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