ORIGINAL ARTICLES

Association between depression and participation in the frontline in the fourth wave of COVID – 19 among medical students in Vietnam: A cross sectional study

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ABSTRACT

Objective: To describe the prevalence of depression among medical students during the fourth wave of COVID-19 in Vietnam and its association with participation in working frontline.

Methods: A cross-sectional study using an online questionnaire with a convenience sample of Hanoi Medical University students who were mobilized to support the frontline of the fight against COVID-19 was conducted. The study collected information regarding participation in the frontline and the mental health disorders using the Depression, Anxiety, and Stress Scale (DASS-21). Descriptive analysis, univariate linear and multivariate regressions were performed.

Results: Over 16% of our sample reported mild to extremely severe depression. Almost two-third of participants of this group reported comorbidity for anxiety and stress. Findings indicated that depressive symptoms were negatively correlated with field tracing and testing work in the frontline.

Conclusion: Our findings highlighted the relatively high prevalence of depression and the potentially high mental health problem comorbidity among frontline medical students in Vietnam. Consequently, we recommend further research on frontline medical students, developing better workplace environment, appropriate interventions that address the link between depression and participation in the frontline, and trainings for junior healthcare workers.

Keywords: *Depression, medical students, mental health, COVID-19.*

INTRODUCTION

Since the first case of COVID-19, detected in Wuhan, China, the virus has swept across the world, resulting in over 350 million confirmed cases and over 5.5 million deaths in total as of January 25, 2022 (1). Such statistics highlight COVID-19 as the cause of a global pandemic. In Vietnam, it is estimated closely to 2.2 million confirmed cases and 37 thousand deaths (2).

Robust evidence calls for attention to the mental health burden faced by frontline health care workers during the pandemic. Worldwide, frontline health professionals experience concerning rates of anxiety (22.1% - 40%), depression (21.7% - 37%) post-traumatic stress disorders (20.2% –

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49%) (3–6). A variety of determinant factors includes perceived preparedness for treating COVID-19; fear of being infected and infecting loved ones; attitudes toward the community's neglect of safety precautions; extended work hours and consistent lack of rest over a long period of time; lack of available protective equipment (7–13).

While understudied, there is conflicting evidence on the levels of concern for frontline medical students' mental health conditions. A few studies showed a high prevalence of depression, anxiety, and burnout for this group (14,15). However, another study found that medical students involved in COVID-19 response work exhibited fewer anxiety and burnout symptoms (16). Moreover, there can be various explanations for greater mental illness symptoms among medical students, ranging from negative perception of work demand, work activity environment, and organizational context, COVID-19 patient care, and lack of personal protective equipment to the training experience (15). Yet, the role of medical students in COVID-19 response varies by country. Even though many countries have encouraged students to voluntarily support national COVID-19 relief programs, others have ceased many practicum experiences during the pandemic to protect students from risks of exposure (17).

The fourth COVID-19 outbreak in Vietnam (April 27th, 2021 to end of 2021) marks the pervasiveness of the Delta variant mostly concentrated in Southern Vietnam, especially Ho Chi Minh City and Binh Duong province. Under the outbreak's increasing threats to community health, medical students have been mobilized to assist existing health professionals at the frontline of COVID-19 control. Therefore, the aim of our study is to describe the prevalence of depression among medical students who served at the frontline in the fourth wave of COVID-19 in Vietnam as well as to investigate the association between depressive symptoms and participation in the frontline.

METHODS

Study design: This is a cross-sectional study design involving a web-based anonymous survey.

Study site and study time: The study was conducted in 3 months from October, 2021 to January 2022 in Hanoi after the last batch of students came back from the frontline in September, 2021.

Study population

Eligible study participants were Hanoi Medical students who had been mobilized to the frontline to support COVID-19 control strategies from 1 to 4 weeks in 2021 in accordance with the official document approved by Hanoi Medical University. Those who either worked at the frontline in 2020 or were unable to give consent/answer questions were excluded from the study.

Sample size and sampling

To estimate the sample size, we used the following formula:

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

In which:

α (2-side significant level) = 0.05

p (Expected proportion in population) = 0.2718

d (absolute precision) = 0.05

$n \geq 303$. A total sample of 304 students participated in the study. Convenient sampling technique was utilized to recruit participants.

Study variables and measuring tool

- Socio-demographic variables are composed of gender, age, training major, current residence place and people to live with.

- Participation in the frontline-related variables include number of times serving at the frontline, assigned location, cumulative time serving at the frontline and type of work in the frontline.

- Depressive symptoms: Depression, Anxiety and Stress Scale (DASS-21) was used to measure the outcome (19latent structure and convergent validity of the Depression, Anxiety and Stress Scale-21 (DASS-21). DASS-21 has been standardized to fit with the context of Vietnam (20). This is a 4-point Likert scale (0 = 'Did not apply to me at all-Never', 1 = 'Applied to me to some degree, or some of the time–Sometimes', 2 = 'Applied to me to a considerable degree, or a good part of time–Often', 3 = 'Applied to me very much, or most of the time–Almost always'), consisting of 21 items. Of which items 3, 5, 10, 13, 16, 17, and 21 are for depression. Subscale scores should range from 0-42. Participants were categorized into different levels of clinical severity: (1) Normal: 0-9; (2) Mild:10-13; (3) Moderate: 14-20; (4) Severe: 21-27; (5) Extremely severe: ≥ 28.

- Comorbidity: a variable generated by combining depression with anxiety or stress at any level or combining all three symptoms all together.

Data collection

The structured questionnaire was designed on the Kobotoolbox application. We sent the link to all students via email and posted the link in the institution's website for student access.

Statistics Analysis

Data were input and analyzed by the STATA 16 software. Findings that followed normal distribution were reported in percentage, means, and standard deviation. Univariate linear regression was used to identify factors associated with depression by treating depression as a binary variable. Multivariable linear regression then was performed to analyze the association between depressive symptoms and participation in the frontline among our participants, adjusted by socio-demographic factors. Statistical significance was evaluated as p-value < 0.05 for all tests.

Potential errors

Recall bias could be potential errors for this study. To reduce the potential recall bias, we conducted pilot study to make all questions understandable and specific. Additionally, we made efforts to carry out data collection activity as soon as the last batch of students came back from the frontline.

Ethics approval

Consent form was obtained from participants before collecting information. All personal and identifiable information was recoded or omitted to ensure confidentiality. The study protocol and procedures were reviewed and approved by Hanoi Medical University (Decision 780/QĐ-DHYHN dated April 8, 2022).

RESULTS

Socio-demographics of the study participants

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Table 1. Socio-demographic characteristics of study participants (N=304)

Characteristics	Frequency (n)	Percentage (%)
Gender		
Male	122	40.13
Female	181	59.54
Other	1	0.33
Age		
20	1	0.33
21	63	20.72
22	89	29.28
23	136	44.74
24	14	4.61
26	1	0.33
Major		
Medical doctor	130	42.76
Preventive medicine	100	32.89
Dentistry	4	1.32
Traditional medicine	7	2.30
Public health	12	3.95
Nurse	39	12.83
Meditech	12	3.95
Current residence		
Own home	76	25.00
Rented home	143	47.04
Dorm	67	22.04
Family/relative's home	18	5.92
Currently living with		
Alone	45	14.80
Friends	155	50.99
Family/Relatives	104	34.21

Table 1 presents socio-demographic characteristics of 304 participants. 181 (59.54%) are females, and 122 (40.13%) are males. Medical doctor students (42.76%) accounted for the majority, followed by preventive medicine students (32.89%) and nurse students (12.83%). A large percentage of students reported living at rented houses (47.05%) and currently living with their friends (50.99%).

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Table 2. Hanoi Medical University students' participation in the frontline (N=304)

Characteristics	Frequency (n)	Percentage (%)
Number of times serving at the frontline		
One	136	44.74
Two	138	45.39
≥ 3 times	30	9.87
Assigned location		
Bac Ninh	87	28.62
Binh Duong	146	48.03
Ho Chi Minh City	64	21.05
Districts in Hanoi	186	61.18
Other	3	0.97
Cumulative time serving at the frontline		
< 2 weeks	46	15.13
2-4 weeks	24	7.89
4-8 weeks	161	52.96
> 8 weeks	73	24.01
Types of work in the frontline		
Contact tracing	126	41.45
Field tracing	75	24.67
Testing support	283	93.09
Patient caring	70	23.03
Vaccination support	176	57.89
Other	10	3.29

The proportion of students reporting participating in the frontline once and twice was similar, accounting for 44.74% and 45.39% respectively. Meanwhile, approximately 10% of participants were involved in the frontline three times. More than half of students was involved in the frontline for a total time of from 4 to 8 weeks (52.96%), and nearly a quarter supported for more than 8 weeks (24.01%).

The majority of students (61.18%) were mobilized to support in the frontline of COVID-19 control in districts in Hanoi. Also, large numbers of students were assigned to Binh Duong (48.03%) and Ho Chi Minh City (21.05%). The most popular type of work was testing, with nearly all surveyed participants reporting related experiences (93.09%), followed by supporting vaccination work (57.89%) and contact tracing (41.25%). Also, 24.67% and 23.03% of participants joined the field tracing and patient caring work, respectively.

Prevalence of depression among Hanoi Medical University students participating in the frontline

Participants responded to DASS-21 involving 21 self-report items which were purposed to assess depressive, anxiety, and stress symptoms. Findings indicated that 70 (23.03%) and 49 (16.12%) students had suffered from anxiety and stress respectively. The number of people having depressive symptoms is 49, the same proportion as the prevalence of stress. In this study, we aimed to deeply explore the prevalence of depression by level.

Table 3. Prevalence by level of depression among students participating in the frontline (N=304)

Depression level	Frequency (n)	Percentage (%)
Normal	255	83.88
Mild	22	7.24
Moderate	19	6.25
Severe	4	1.32
Extremely severe	4	1.32

Despite a large number of students having the "normal" status (83.88%), 49 respondents had symptoms of depression, including 22 (7.24%) students of "mild" level, 19 (6.25%) of "moderate" level, and 4 (1.32%) of each reporting the "severe" and "extremely severe" levels.

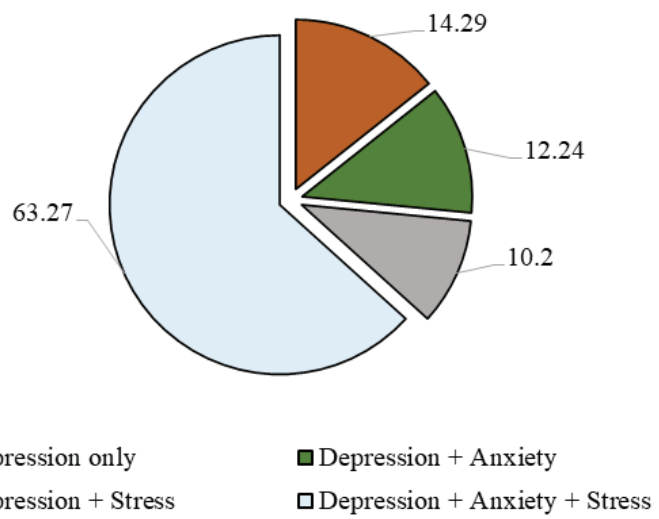

Figure 1. Percentage of depression and comorbidities (N=49)

To be specific, among those who showed symptoms of depression (N=49), nearly two-third (63.27%) had depression along with anxiety and stress, accounting for the largest proportion. 22.44% had depression with another disorder, and 14.29% had depression only.

Association between depression and participation in the frontline among medical students.

Table 4. Factors associated with depression among medical students participating in the frontline (N=304)

Factors	Univariate regression		Multivariate regression**	
	Coef	95% CI	Coef	95%CI
Number of times serving at the frontline				
One	ref.		ref.	
Two	0.53	-0.87 – 1.93	-0.60	-3.71 - 2.51
≥ 3 times	3.31*	0.96 – 5.65	1.40	-3.40 - 6.14
Assigned location				
Bac Ninh	0.85	-0.64 – 2.33	0.08	-4.42 - 4.59
Binh Duong	1.65*	0.31 – 2.98	2.37	-1.61 - 6.35
Ho Chi Minh City	-1.06	-2.71 – 0.59	0.38	-4.01 - 4.77
Districts in Hanoi	0.21	-1.71 – 1.59	0.25	-3.30 - 3.81
Other	-4.00	-15.76 – 7.75	-3.47	-16.27 - 9.34
Cumulative time serving at the frontline				
< 2 weeks	ref.		ref.	
2-4 weeks	0.18	-2.77 – 3.12	-3.34	-8.23 -1.53
4-8 weeks	1.75	-0.21 – 3.70	0.41	-3.92 - 4.73
> 8 weeks	1.68	-0.53 – 3.88	-1.24	-6.60 - 4.13
Types of involvement in the frontline				
Contact tracing	0.06	-1.03 – 1.43	-0.67	-2.41 - 1.05
Field tracing	0.22	-1.34 – 1.78	-2.00*	-3.92 - -0.07
Testing support	-3.28*	-5.91 - -0.65	-4.39*	-7.46 - -1.32
Patient caring	0.71	-0.88 – 2.31	-0.46	-2.62 - 1.70
Vaccination support	0.07	-1.29 – 1.34	0.11	-1.65 - 1.86
Other	-2.68	-6.44 – 1.08	-1.73	-5.74 - 2.27

**p<0.05*

***adjusted for socio-demographic characteristics (gender, age, current residence, currently living with)*

Univariate linear regression model is used to investigate factors associated with depression among medical students participating in the frontline. The results indicate that there was a significant positive association between being involved in the frontline more than three

times with depression scores [95%CI= (0.96 – 5.65)]. Additionally, people supported in Binh Duong had a higher level of depression than those who supported in other location [Coef: 1.65, 95%CI=(0.31;2.98)]. Apart from this, the involvement in testing support presents a significant negative association with depressive symptoms [95%CI=(-5.91; -0.65)].

Multivariate linear regression model shows that students taking part in field tracing had a lower level of depression than those who did not [95%CI = (-3.92; -0.07)]. Similarly, there was a negative association between testing support and depression scores [95%CI = (-7.46; - 1.32)]. No association found between cumulative time serving at the frontline and depression scores.

DISCUSSION

The fourth wave of COVID-19 starting from late April, 2021 in Vietnam has introduced a monumental burden on the public health care system and existing medical facilities, demanding greater efforts from all human resources in health-related fields. As Vietnam confronts the most threatening outbreak yet, nearly 800 students from Hanoi Medical University have been mobilized to support four highly contagious hotspots (i.e., Bac Ninh, Binh Duong, Ho Chi Minh city, Hanoi).

In this study, the majority of participants were female, which is similar to a study on mental health among U.S. medical students during the COVID-19 pandemic (21). However, the difference is that this study investigated depressive symptoms among medical students who were involved directly in COVID-19 responses, while the study in the U.S. examined mental health conditions of medical students in university settings. Among our participants, students specialized in medical doctor and preventive medicine accounted for the largest proportion. Additionally, the majority of our sample reported supporting at the frontline twice and the most common cumulative time serving at the frontline was from four to eight weeks. Also, it was found that participants engaged in a wide range of involvements in the frontline such as testing, vaccination, contact tracing or even providing immediate care to COVID-19-infected patients.

Our study found that over 16% of students showed symptoms of mild to extremely severe depression, which was somewhat similar to the prevalence of depression (almost 15%) found among COVID-19 patients-caring primary care staff in a different study (22). In addition, findings indicated that, among those who had depression symptoms, only 14.29% of students had depression only, while nearly two-thirds of them experienced depression, anxiety, and stress at the same time. While primary care staff may be responsible for a greater workload, especially more direct care for COVID-19 patients, the similarity in levels of depression between medical students in our sample and primary care staff from another study can imply a uniform effect of participation in COVID-19 responses on all frontline health care workers (23). Robust evidence highlights factors related to increased depression among primary care professionals working during the COVID-19 pandemic: an overwhelmingly burdensome number of hospitalization cases despite limited health care human resources (24); extended work hours and consistent lack of rest over a long period of time (13); low confidence in the availability of personal protective equipment (13). Also, many studies

pointed out that, among health care workers, fear of contracting COVID-19 or transmitting it to relatives and fear of personal death or relatives' deaths because of the virus both significantly inflated risks of depression (9–12). Not only do such factors help explain the rate of depression among frontline medical students, but also training experiences. It is possible because medical students received their initial practical experiences through supporting COVID-19 frontline work and felt overwhelmed, which could relate to their relatively high prevalence of depression.

Additionally, our univariate regression model suggested that engagement in COVID-19 testing and assignment to Binh Duong province were related to depressive symptoms. A different study set in the COVID-19 epicenter of Da Nang city in Vietnam found a positive correlation between increased stress and handling bio samples from suspected or infected patients among frontline health care workers (13). On the contrary, we found that medical students who supported COVID-19 testing experienced significantly lower depressive symptoms than those of other frontline tasks. This discrepancy could be explained by medical students' levels of engagement in COVID-19 testing. It could be that primary care professionals were in charge of the majority of testing while medical students only assisted in minor capacity, which could translate into differential risks for depression. Also, the study in the epicenter of Da Nang city noted particular higher stress levels than other studies in other countries where the locations of survey were low in COVID-19 cases (13). This evidence implies that perhaps the quality of mental well-being for frontline medical staff could be dependent on whether the staff are based in a pandemic hotspot or not. Such a speculation could explain why medical students who were assigned to Binh Duong in our sample experienced greater depressive symptoms. As this province was one of the locations with the highest COVID-19 cases in the fourth wave, we anticipate that medical students assigned to Binh Duong could face greater work burnout and ultimately greater risks for depression.

In addition, we found that, for Vietnamese medical students, being involved in COVID-19 response team more than three times was related to increased depressive symptoms. One study in Russia found that working for over six months was associated with increased emotional exhaustion and anxiety among heath care workers during the COVID-19 pandemic (25) And other research indicates that emotional exhaustion is positively associated with depressive symptoms (26). Such findings allude to the possibility that extended involvement in frontline COVID-19 care can be related to our participants' depression. There are possible explanations for this possibility. Because higher workload and increased time spent caring for COVID-19 infected patients are linked with reduced mental well-being (10, 27, 28survey-based, region-stratified study collected demographic data and mental health measurements from 1257 health care workers in 34 hospitals from January 29, 2020, to February 3, 2020, in China. Health care workers in hospitals equipped with fever clinics or wards for patients with COVID-19 were eligible.The degree of symptoms of depression, anxiety, insomnia, and distress was assessed by the Chinese versions of the 9-item Patient Health Questionnaire, the 7-item Generalized Anxiety Disorder scale, the 7-item Insomnia Severity Index, and the 22-item Impact of Event Scale–Revised, respectively. Multivariable logistic regression analysis was performed to identify factors associated with mental health outcomes.A

total of 1257 of 1830 contacted individuals completed the survey, with a participation rate of 68.7%. A total of 813 (64.7%) a lack of adequate rest allows little time for burnout recovery and healthy mental health care (29) and ultimately, could predict increased depression. Alternatively, the medical students who involved more than three times in the COVID-19 response team experienced greater depressive symptoms possibly because of more quarantined experiences. In a study on the impacts of the first wave of COVID-19, quarantined experience was related to the increase in fear and stress in healthcare workers due to emotional isolation and loneliness experienced during quarantine (30). Given that every frontline worker in Vietnam during the peak of the fourth wave was mandated to quarantine for 1 - 2 weeks after each support period, we speculate that involvement in more than three support periods could enlarge the accumulated fear and stress for medical students.

In multiple regression model, involvement in field tracing and providing testing services has negative association with depression scores. There is robust literature supporting that health care staff who do not carry out frontline tasks shows significantly lower risks for mental health problems than those who do. 31-33 Similarly, we found that medical staff who assisted with contact tracing showed fewer depressive symptoms. It is possible because the nature of this task does not entail fewer exposure risks and less work burnout than other tasks such as administering PCR tests or caring for COVID-19-infected patients.

There may be limitations to our study. Because we employed a convenient sampling method, our results may not be generalizable to all medical students who were sent to participate in the frontline of the fourth wave. Also, this method may explain why the prevalence rate for depression for our sample (16%) was much lower than that for frontline health care professionals (21.7% - 37%) (3-6). As such, we recommend future research focusing on the use of randomized sampling and determining a more representative prevalence rate for depression among medical students in Vietnam.

CONCLUSION

The prevalence of depression and mental health problem comorbidity among frontline medical students in Vietnam is relatively high. Findings from the study imply that at the structural level, more investment in developing better medical workplace environment, and effective interventions for those who get involved in responding to infectious disease outbreak is essential. In addition, given the concerning rate of comorbidity, key stakeholders should provide mental health support programs that accommodate a wide range of mental health needs instead of just depression. At the individual level, junior medical staff must be well-prepared so sufficient trainings are needed. Additionally, as evidence on the mental well-being of frontline medical students remains extremely modest, we recommend greater efforts on expanding this line of literature.

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