POST-TRAUMATIC STRESS DISORDER AMONG UNIVERSITY STUDENTS IN THE VIETNAM'S FOURTH COVID-19 WAVE

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Abstract - Since March 2020, the COVID-19 pandemic has become a global concern, affecting students' mental health. This study aims to explore the prevalence of post-traumatic stress disorder (PTSD), and sleep disturbance among Vietnamese students during the fourth COVID-19 wave. An online survey was performed with a questionnaire based on the Impact of Event Scale-Revised scale (IES-R). A total of 302 students were included in the study, in which there are 11.3% had PTSD. The prevalence of PTSD in female was higher than in male (p=0.006) and students who were fear of vaccine's side effects had five times higher likelihood of PTSD compared to those who were not (p=0.009). In addition, changes in bedtime and wake-up times were associated with increased odds of PTSD in students (Adjusted Odds Ratios: 3.42, 95% Confidence Intervals: 1.90 to 6.16). The results emphasize the high prevalence of PTSD among students, which could have short- and long-term mental health impacts.

Key words - Mental health; post-traumatic stress disorder (PTSD); COVID-19; Vietnamese students; sleep disturbance; vaccine

1. Introduction

PTSD is a mental health disorder that may emerge following a frightening or traumatic event in a person's life [1]. In 2012, an estimation of 3.6% of the global population suffered from PTSD [2]. About one-third of Vietnam veterans have been diagnosed with PTSD [3]. Although PTSD can occur at any age, it is most common in young and middle adulthood [4]. More than 10% of respondents in a survey conducted in 21 nations reported having observed violence (21.8%) or experienced interpersonal violence (18.8%), accidents (17.7%), war (16.2%), or trauma to relatives (12.5%) [5].

The emergence of a new strain of coronavirus (COVID-19), with a rapid increase in number of infections, has resulted in more than 5 million deaths globally as of November 14, 2021 [6]. It is a global pandemic that has a significant impact on many aspects of life, including mental health, increasing the prevalence of persons suffering from PTSD. On July 22, 2021, World Health Organization (WHO) confirmed that the mental health consequences of the COVID-19 pandemic will be long-lasting and far-reaching on children and young people, as well as the complexity and urgency of the mental health challenges and warned against underestimating the pandemic's long-term mental health consequences [7]. Simultaneously, an increase in declining mental health may impose a financial burden on the country. The economic costs of mental illness accounted for more than 4% of Gross Domestic Product (GDP) — or more than 600 billion euros - in 28 countries in 2015 [8]. According to the United Nations Children's Fund, the COVID-19 pandemic has prompted school closures in 14 countries, with 168 million students affected globally since March 2020 [9]. In Turkey, the prevalence of students with PTSD aged 18-20 and 21-35 years old was 35.1% and 34.2%, respectively [10]. Nearly a third of students claimed that their mental health had deteriorated since the outbreak of COVID-19, with the feeling of anxious (22.2%), stressed (17.9%), and having sleep problems such as difficulties in falling asleep (22%) and poor sleep quality (25.9%) [11]. Declining mental health also influences the acceptance of COVID-19 vaccination, with 5.2% of participants preferring not to be vaccinated and 6.0% refusing to be vaccinated [12]

This study aims to evaluate the level of PTSD, fears, and sleep disturbances among Vietnamese students. The survey was carried out during the most severe outbreak in Vietnam since the beginning of the pandemic. This provides the initial assessment of the impact of the COVID-19 pandemic on mental health, allowing for the development of timely and effective interventions to improve the mental health of students.

2. Method

2.1. Study design and participants

This is a cross-sectional description. Data collection was conducted online using Google Form from August 6 to September 10, 2021. A questionnaire based on the Impact of Event Scale-Revised (IES-R) scale was posted on online student forums. Students who studying at universities/colleges in Vietnam were invited to participate in the survey. A total of 307 participants were recorded. Among those, 302 responses were in the final analysis and five responses were excluded due to 4 were not currently resident in Vietnam, 1 missing the majority of the questions. The ages of the included students ranged from 18 to 23, with a mean age of 20 ± 1.02.

2.2. Questionnaire

The questionnaire consisted of three main parts: **(1)** Demographics characteristics: age, occupation, gender, quarantine status, vaccination status; **(2)** Assessement of the level of PTSD through the IES-R scale: Through 5 corresponding levels (0-Not at all; 1-A little bit; 2-Moderately; 3-Quite a bit; 4-Extremely). The total score to determine the status of PTSD was divided into 4 levels: Under 24 points – Normal; Between 24 and 32 points – Mild (need to monitor PTSD in the future); From 33 to 36 points

– Moderate (a good diagnosis of PTSD is possible); More than 37 points –Severe (with consequences even 10 years later) [13]. This scale was divided into 3 groups of scales including: Hyperarousal (items 4, 10, 15, 18, 19, 21), Avoidance (items 5, 7, 8, 11, 12, 13, 17, 22) and Intrusion (items 1, 2, 3, 6, 9, 14, 16, 20) [14]; **(3)** Assessment of fears, sleep disturbances, and vaccine acceptance: Fears were assessed through 14 Yes/No questions (fear can be a source of infection for others, fear of relatives leaving home, fear of infected relatives, fear of having to leave school/workplace for a long time, fear of getting infected, fear of leaving the house, fear of not being able to go back to school, fear of not being able to see friends/relatives, fear of being shunned by friends, stigmatized since infection, fear of unsecured income, fear of quarantine, fear of not having enough food, fear of not being able to participate in outdoor activities, fear of not being able to participate in activities at home); Sleep disturbances were assessed by 4 Yes/No questions (frequent nightmares, fear of sleeping alone, wake up at midnight, change the bedtime and wake up).

2.3. Statistical analysis

Quantitative variables such as level of PTSD were presented with mean and standard deviations (SD). Qualitative variables such as demographics characterstics, fears and sleep disturbances were calculated as percentages. Chi-square test was applied to compare percentages between two groups of qualitative variables and T-test was used to compare mean values between two groups of quantitative variables.

The crude Odds Ratios (OR) and 95% Confidence Intervals (95% CI) were estimated using binary logistic regression analysis to assess factors associated with PTSD level. The multivariate logistic regression was utilized to identified adjusted OR. R language version 4.1.2 (R Foundation for Statistical Computing, Vienna, Austria) was used to perform the analysis.

2.4. Ethical Consideration

Participants were introduced to the purpose of the study. The first question of the questionnaire was designed as a written informed consent. The collected data were completely anonymous and used for research purposes only.

3. Result

3.1. Demographic characteristics

A total of 302 responses were in final analysis. The age of the participants ranged from 18 to 23, with a mean age of 20 ± 1.02. Most of students were female (n=198; 65.6%) and in their first to third year of study (n=200; 66.2%). The majority of students living in the central region of Vietnam (n=252; 83.0%). More than half of the participants (n=158, 52.3%) were subjected to home quarantine. Almost all students (n=301; 99.7%) have received information about pandemic prevention measures.

3.2. PTSD among students

Our findings showed that 11.3% of students had symptoms of PTSD with 3.3% had PTSD can be diagnosed and 8.0% had severe PTSD symptoms that could have consequences (Figure 1).

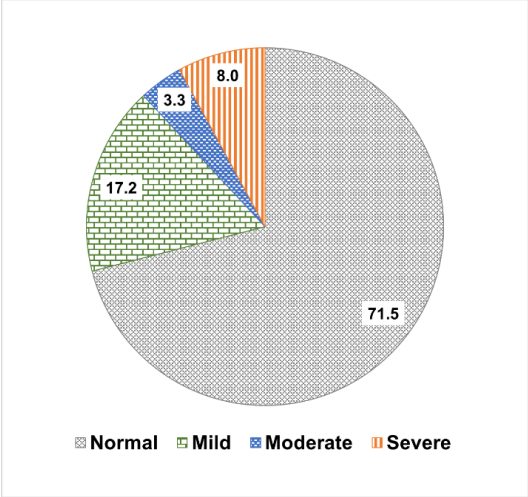

Figure 1. *Prevalence of students at different level of PTSD*

Females had significantly higher intrusion scores than males (p=0.020). In the group of students from 1st to 3rd year and 4th to 6th year, the mean ± SD of intrusion scores was 7.27 ± 4.31 and 7.36 ± 4.41 respectively. The difference in intrusion score between students 1st to 3rd year and 4th to 6th year was not statistically significant. The mean ± SD of avoidance score in the group that had been quarantined at home reached 5.90 ± 4.03. However, the difference in avoidance score between group that had been quarantined and those who had not been quarantined was not statistically significant. Students who had been quarantined at home had a higher rate of PTSD (31.6%) than the other groups (25.1%), but this difference was not statistically significant.

Table 1. *Correlation of PTSD degree and related factors*

Characteristics		Normal	Mild	Moderate	Severe
		n (%)	n (%)	n (%)	n (%)
Gender	**Male**	78 (36.1)	18 (34.6)	2 (20.0)	6 (25.0)
	Female	138 (63.9)	34 (65.4)	8 (80.0)	18 (75.0)
	p	< 0.001	0.0006	0.0089	0.006
Grade	**1st to 3rd year**	142 (65.7)	35 (67.3)	7 (70.0)	16 (66.7)
	4th to 6th year	74 (34.3)	17 (32.7)	3 (30.0)	8 (33.3)
	p	< 0.0001	0.0004	0.0812	0.0220
Quarantined at home	**Yes**	108 (50.0)	30 (57.7)	6 (60.0)	14 (58.3)
	No	108 (50.0)	22 (42.3)	4 (40.0)	10 (41.7)
	p	1.0000	0.1181	0.3833	0.2551
Ready for vaccination	**Yes**	206 (95.4)	50 (96.2)	9 (90.0)	24 (100.0)
	No	10 (4.6)	2 (3.8)	1 (10.0)	0 (0.0)
	p	< 0.0001	< 0.0001	0.0005	< 0.0001
Fear of vaccine side effects	**Yes**	88 (40.7)	27 (51.2)	8 (80.0)	9 (37.5)
	No	128 (59.3)	25 (48.8)	2 (20.0)	15 (62.5)
	p	0.0001	0.6998	0.0089	0.0865

The correlation of PTSD level and related factors are summarized in Table 1. The prevalence of severe PTSD in females (75.0%) was 3 times higher than in males (25.0%, p=0.006). The 1st to 3rd year students who experienced severe PTSD was 66.7%, while this rate in the 4th to 6th year

students was lower at 33.3% (p= 0.022). Prevalence of severe PTSD was higher in the group of student who were quarantined at home (58.3%) than in the group were not quarantined at home (41.7%), but the difference was not statistically significant.

The group of student that feared the side effects of vaccine had a 5-fold higher likelihood of PTSD compared to those who not (p=0.009).

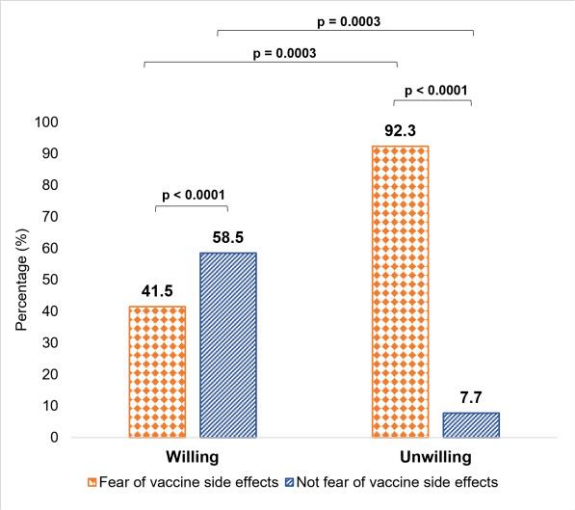

Figure 2. *Comparison of the fear of side effects when vaccinated between vaccination willingness and unwillingness group*

3.3. Comparison of fear of vaccine side effects between vaccination willingness and unwillingness group

Majority of students were willing to get vaccinated against COVID-19 (n=289; 95.7%). However, 43.7% of students were fear of vaccine side effects. The proportion of students unwilling to get vaccinated was significantly higher in group of students that fear of side effects (92.3%) compared to those who were not fear of side effects (7.7%) (p<0,001) (Figure 2). The proportion of students who fear of vaccine side effects was higher in vaccination unwillingness group (92.3%) compared to vaccination willingness group (41.5%) (p < 0.001).

3.4. Fears, sleep problems during the outbreak

Most of the student were fear of leaving the house (70.2%); fear of becoming a source of infection for others (86.1%). A half of students changed their bedtime and wake up time (54.3%). Proportion of other fears are presented in Table 2.

Table 2. *Prevalence of student with fear and sleep problems during the outbreak*

Characteristics		n	%
Fearful	Fear can be a source of infection for others	260	86.1
	Fear of relatives leaving home	259	85.8
	Fear of infected relatives	252	83.4
	Fear of having to leave school/workplace for a long time.	222	73.5
	Fear of getting infected	216	71.5
	Fear of leaving the house	212	70.2
	Fear of not being able to see friends/ relatives	207	68.5
	Fear of not being able to go back to school	203	67.2
	Fear of being shunned by friends, stigmatized since infection	168	55.6
	Fear of unsecured income	162	53.6
	Fear of quarantine	135	44.7
	Fear of not having enough food	133	44
	Fear of not being able to participate in outdoor activities.	124	41.1
	Fear of not being able to participate in activities at home.	71	23.5
Sleep	Frequent nightmares	23	7.6
	Fear of sleeping alone	37	12.3
	Wake up at midnight	41	13.6
	Change the bedtime and wake up	164	54.3

Table 3. *Correlation of PTSD degree and related factors*

Characteristics		No PTSD	PTSD	Unadjusted OR (95% CI)	P-value	Adjusted OR (95% CI)	P-value
Gender	Female	78 (75.0)	26 (25.0)	Reference		Reference	
	Male	138 (69.7)	60 (31.3)	1.3 (0.76-2.23)	0.333	1.15 (0.64-2.08)	0.642
Regions	Northern	8 (88.9)	1 (11.1)	Reference		Reference	
	Central	180 (71.4)	72 (28.6)	3.2 (0.39-26.05)	0.277	2.32 (0.26-20.95)	0.455
	Southern	28 (68.3)	13 (31.7)	3.71 (0.42-32.87)	0.238	2.24 (0.22-22.59)	0.493
Quarantine at home	No	108 (75.0)	22 (15.3)	Reference		Reference	
	Yes	108 (64.8)	30 (18.9)	1.39 (0.84-2.3)	0.202	1.48 (0.86-2.56)	0.155
Ready for vaccination	No	10 (76.9)	2 (15.4)	Reference		Reference	
	Yes	206 (71.3)	50 (17.3)	1.34 (0.36-5)	0.660	0.92 (0.22-3.76)	0.907
Fear of vaccine side effects	No	128 (75.3)	25 (14.7)	Reference		Reference	
	Yes	88 (66.7)	27 (20.4)	1.52 (0.92-2.52)	0.100	1.38 (0.78-2.42)	0.268
Fear of sleeping alone	No	192 (72.5)	73 (27.5)	Reference		Reference	
	Yes	24 (64.9)	13 (35.1)	1.42 (0.69-2.95)	0.340	1.2 (0.51-2.85)	0.677
Frequent nightmares	No	202 (72.4)	77 (27.6)	Reference		Reference	
	Yes	14 (60.9)	9 (39.1)	1.69 (0.7-4.06)	0.243	0.5 (0.15-1.7)	0.282
Wake up at midnight	No	196 (75.1)	65 (24.9)	Reference		Reference	
	Yes	20 (48.8)	21 (51.2)	3.17 (1.61-6.21)	**< 0.001**	4.67 (1.91-11.42)	**< 0.001**
Change the bedtime and wake up	No	115 (83.3)	23 (16.7)	Reference		Reference	
	Yes	100 (61.0)	64 (39.0)	3.12 (1.8-5.39)	**< 0.001**	3.42 (1.9-6.16)	**< 0.001**

Multivariable logistic regression analysis showed that students who changed their bedtime and wake-up times was 3.42 times more likely to have PTSD compared with students who didn't change their bedtime and wake-up times (aOR: 3.42; 95% CI: 1.90 to 6.16). Furthermore, waking up at midnight was an associated factor of PTSD in students (aOR=4.67, 95% CI: 1.91 to 11.42) (Table 3).

4. Discussion

The impact of Vietnam's fourth COVID-19 wave on the mental health of Vietnamese students was evaluated in our study. There was 11.3% of all students showed PTSD symptoms, with 8.0 % had severe PTSD. Severe PTSD could lead to an increased risk of asthma, depression, cardiovascular disease, anxiety disorders, stroke, and certain types of cancer [15]. Thus, people with PTSD may encounter adverse conditions for their own health in the future, and at the same time, the incidence of these diseases in the community will also increase and become a burden on the health sectors of the country. One of the primary reasons of declining mental health among students during a COVID-19 pandemic is the mitigation techniques adopted to combat its spread, such as home quarantine, school closures, and decreased social connections. This also leads to loneliness, increased sedentary behaviors and less physical activity [7]. Furthermore, the findings indicated that in the intrusive scale groups, females' mean scores are almost always higher than males', implying that females are at a higher risk of developing PTSD than males. In addition, females usually suffer from more stressful life events than males [16]. As a result, universities should have a strategic approach to improve the mental health of students, with additional focus on that of female students. Moreover, 1st to 3rd year students had more severe PTSD symptoms than 4th to 6th year students (66.7% and 33.3%, p=0.0220). The reason for this could be those students in their fourth to sixth years have more extensive knowledge and experience, so the prevalence of PTSD may be lower. Information about vaccine side effects, some experiencing severe reactions, such as deep vein thrombosis, transverse myelitis, and even anaphylactic shock, has become one of the reasons why students fear vaccine side effects [17-20]. Prevalence of PTSD was 5 times more likely in the group with fear of side effects (6.1% and 1.2%, respectively; p=0.009). Moreover, the rate of PTSD in our study was 15.8% higher than that of China, but it was 6% lower than that of Turkey [10, 21]. This difference may be due to diversity in study designs, study population, culture, questionnaire scales, and levels of impact pandemic between countries, but it also indicates that Vietnam is a heavily affected country by the pandemic. It is critical to inform and educate students about the side effects of the COVID-19 vaccine to improve their confidence on COVID-19 vaccination.

We discovered that most participants were fearful as a result of the pandemic's impact. The increasing number of patients and suspected cases, as well as the increasing number of provinces and countries affected by the outbreak wave have made them concerned about the disease's spread. [22]. Furthermore, measures to limit exposure, and online learning can increase fear in students [23]. In our study, 70.2% of participants were fear to leave the house, and 71.5% were fear of getting infected themselves. These rates were higher if their family members were out of the house (85.8%) and infected (83.4%). This may suggest that the anxiety of family members plays a role in increasing the fear among students. In addition, social distancing results in universities/colleges being temporarily closed for extended periods of time, which can cause students to fear being out of school for too long (73.5%) and not being able to return to school (67.2%) and not seeing friends (68.5%). It also delays practical courses, not having direct access to practice equipment that causes students to have a sense of fear in them [24]. Fear of university students about COVID-19 may affect their studies and future employment. Similarly, postponing examinations for an indefinite period has raised anxiety and apprehension in the students. Many final-year students have their graduation on hold. It may be a cause to increase the rate of fear in students [23]. The pandemic COVID-19 has increased the risk of mental health problems among young people, adding to a population-level trend of mental health [7]. Moreover, since students are the main source of future employment in the country, it can affect socioeconomics [25]. On the other hand, prolonged stress is also one of the causes of sleep disturbance [26], such as changed bedtime (54.3%), waked up in the midnight (13.6%), and had nightmares (7.6%). Long-term sleep disturbances increase the risk of high blood pressure, diabetes, obesity, depression, cardiovascular disease, and stroke [27].

In China, the proportion of students who were ready to be vaccinated was 92% [28], Vietnam had a higher rate of 95.7%. However, concerns about side effects and vaccine efficacy were major barriers to vaccination, and these can be seen in many other countries around the world [29]. In addition, some other important factors that cannot be ignored in the foreground during the COVID-19 pandemic are a lack of trust in policymakers, health operators, and providersvaccination [30]. These elements need to be considered research to address the situation of domestic application projects [31].

5. Conclusion

Our results indicated that negative mental health impacts of COVID-19 pandemic are common among Vietnamese students with nearly one-third of students presented symptoms of PTSD. Sleep disturbances, increased fear, and the prevalence of fear of COVID-19 vaccine side effects were associated with the incidence of PTSD during the Vietnam outbreak of the COVID-19 pandemic. Hence, improved sleep and decreased fear should be expected to reduce the risk of PTSD during the pandemic.

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