

# Prevalence of Stress, Anxiety, Depression and Associated Factors in Medical Students: A Review and Analysis

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## SUMMARY

**Background:** Depression has become a major public health burden in most countries worldwide.

**Objective:** However, there has not been a study conducted to record the above situation from the perspective of literature review in Vietnam. As the result, we conducted this study with the aim of determining the prevalence of stress, anxiety, and depression among college students and related factors in Vietnam.

**Result:** Up till July 2022, 11 studies on Stress, Anxiety, Depression among Medical-Pharmaceutical students were reviewed from Google Scholar. The PHQ9, DASS21, and CES-D scales were utilized in the 11 studies below to evaluate the rates of stress, anxiety, and depression alone or in combination. The consistency and reliability of the three scales were determined using Cronbach's alpha coefficient.

**Conclusion:** It is recommended to select at least 2 measurement scales in a study to diagnose and compare the above results.

**Keywords:** Scales; Stress; Anxiety; Depression; Students; Medicine; Pharmacy

**Abbreviations:** WHO: World Health Organization; DSM-IV: Diagnostic and Statistical Manual of Mental Disorders; CES-D: Center for Epidemiological Studies Depression Scale; EFA: Exploratory Element Analysis; SINS: Stressor in Nursing Students scale; AMS: Academic Motivation Scale; SDI: Self-Determination Index

## Introduction

According to the World Health Organization (WHO), depression is a common mental disorder characterized by persistent sadness, loss of interest in normally enjoyed activities, and inability to carry out usual activities for at least two weeks [1]. According to the table fourth psychiatric classification of the American Psychiatric Association (DSM- IV, 1984) "Depression is a state of emotional disorder, manifested by decreased mood, loss of interest and pleasure, dropped energy leads to increased fatigue and decreased activity, commonly increasing fatigue after some minor exertion, persisting for a prolonged period of time, at least two weeks" [2]. Depression has become a major burden on public health in most countries worldwide. According to the latest estimates from WHO, there are currently more than 280 million people of all ages suffering from depression, accounting for 3.8% of the population, including 5% of adults [3]. The number of university students experiencing mental health problems

has increased in many countries around the world, mainly depression and anxiety [4]. Depression with its consequences of reducing labor productivity, is becoming increasingly common among students in general and medical school students in particular [1]. In Vietnam, according to research by Tran Quynh Anh et al, conducted on 2,099 students at 8 major medical universities across the country using the CES-D scale, 43.2% of 2,099 students show signs of depression [4,5].

There have been many quantitative studies conducted to determine the rate of medical students suffering from depression and factors related to depression among medical students in Vietnam. However, as far as we know, no research has been conducted to document the above situation from an overview perspective. Therefore, we conducted this study with the goal of overview analysis to determine the rate of stress, anxiety, depression in students and associated factors in Vietnam.

## Participants & Methods

### Methods

The review was conducted using retrospective studies extracted from the database of

- 1) Medical research journal
- 2) Vietnam Medical Journal
- 3) Google Scholar
- 4) Journal of Preventive Medicine
- 5) Journal of Social Sciences, Humanities and Education, until July 2022.

We selected descriptive research and comparative analysis of the prevalence of stress, anxiety, depression, and associated factors in Medical and Pharmacy students.

### Scale for Measuring Stress, Anxiety and Depression

**PHQ-9 Stress, Anxiety and Depression Scale:** The risk of depression among medical students was assessed based on the Vietnamese version of the PHQ-9 scale, this set of questions has been standardized in many studies in other countries. The PHQ-9 questionnaire is based on the standards of the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV), including 9 questions with a total score ranging from 0 to 27. Each question is evaluated with scores of 0, 1, 2, 3 (in which 0: None, 1: A few days, 2: More than half of the days of the week, 3: Almost every day). With a total PHQ-9 score greater than or equal to 10, the diagnosis of typical depression has a sensitivity and specificity of 88% for detecting severe depression [5,6]. This assessment scale was developed by Dr. Spitzer Williams in conjunction with Kroenke to screen for basic symptoms of depression. This set of questions will be answered for a period of 2 consecutive weeks before the assessment. 9 questions with 3 answers are scored so the highest total score will be 27 points. The PHQ-9 depression scale includes 9 questions. For PHQ-9, the level of depression is divided as follows: 0-4: Normal, 5-9: minimal depression; 10 – 14: mild level; 15 – 19: moderate level; 20 – 27: severe level [6-8].

**DASS21 Stress, Anxiety and Depression Scale:** The DASS21 shortened stress, anxiety and depression scale has been standardized to adapt to the Vietnamese context by author Tran Thach Duc and colleagues (2013). Survey participants will self-assess their emotional level over the past week based on 21 subsections on a scale: (0) not true of me at all (1) true of me mostly, or true most of the time (2) True for me a lot, or true most of the time (3) True for me absolutely, or true most of the time. How to convert DASS21 scale scores is presented in (Table 1). Cronbach's Alpha reliability coefficient of the DASS21 scale is 0.826; in which, the Cronbach's Alpha coefficient of the stress, anxiety, and depression subscales is 0.882, respectively; 0.779; 0.848, proving that this is a highly reliable tool, suitable for the mental health research model of students in the study sample [7,9]. Research on a

group of students at Ho Chi Minh University of Medicine and Pharmacy conducted to measure the reliability of the DASS21 scale using the Cronbach Alpha coefficient with the results of coefficient evaluation. The results showed that all 3 groups of stress, anxiety and depression questions had Cronbach alpha values >0.6. When removed any question in the set of 7 questions in each group, the Cronbach alpha value decreased. The study noted that the questions in each section were closely correlated with each other [10].

**Table 1:** Severity of stress, anxiety, and depression are converted according to DASS21 scale.

Severity	Stress	Anxiety	Depression
Normal	0-14	0-7	0-9
Mild	15-18	8-9	10-13
Moderate	19-25	10-14	14-20
Severe	26-33	15-19	21-27
Extremely severe	>34	>20	>28

**CES-D Stress, Anxiety and Depression Scale:** The depression scale was translated based on the Center for Epidemiological Studies Depression Scale (CES-D), USA and built according to specific procedures, then tested with 12,447 adolescents and young people in Chi Linh district, Hai Duong province. The results of Exploratory Element Analysis (EFA) show that the depression scale includes 16 items divided into 2 clear groups of elements with a relatively high correlation (>0.3) in each element [11]. The CES-D scale is a standardized scale consisting of 20 questions, assessing common symptoms in the past week. Each question is rated on a 4-point scale, with the following severity [12]:

- 0: never or rarely <1 day
- 1: appears a few times or every 1-2 days
- 2: occasionally, occasionally or on average 3-4 days
- 3: very often or most of the time, for or more than 7 days.

Calculate the total score of the questions, the total score results are analyzed in 2 levels:

- <22 points: no risk of depression
- ≥ 22 points: at risk of depression

The scale has high internal consistency reliability: element 1 with Cronbach's Alpha=0.91; element 2 with Cronbach's Alpha=0.75. The overall Cronbach's Alpha parameter for the entire depression scale is 0.82, showing that the 16 variables are closely related to each other. This tool ensures quality and can be used in community research with adolescents and young people in Chi Linh district, Hai Duong province and Vietnam in general. Factors such as age, gender, marital status, education level and living area are all associated with the average score measuring depression [11].

## Results

**Table 2:** Rate of depression among medical and pharmacy students in some Vietnamese research.

Research name	Research objective	Sample size (people)	Screening tools	Depression rates (%)	Associated factors to depression
Nguyen Huu Minh Tri, et al. [1]	Current status and related factors of depression among students of Can Tho University of Medicine and Pharmacy, 2013	No information	A cross-sectional study by CES-D scale.	Results showed that 19% of students was at depressive risk, 7% of students had light-depression, 19% of students had major-depression	Some related factors are: medical majors, study pressure, family circumstances, orphan father and/or mother, part-time job
Nguyen Thi Bich Tuyen, et al. [2]	The purpose of this study is a descriptive cross-sectional survey with an analysis of the rates of stress, anxiety and depression among final-year Pharmacy students (school year 2019-2020) at 2 universities in Dong Nai.	134	A cross-sectional analysis method was conducted using the short version of Depression, Anxiety and Stress Scale (DASS21)	The results included 134 shows that the prevalence of students experienced stress, anxiety, and depression was 16.4%, 29.8% (with severe anxiety accounting for 6%) and 38.8% (with severe depression accounting for 0.7%)	There is a statistically significant difference between groups of students with different academic results. These findings contribute to the construction of appropriate intervention strategies to enhance student's mental health, improve patient care in pharmacy, and prepare more effectively for future clinical professional careers.
Phan Thanh Truc Uyen et al [3]	Assessing severity of stress, anxiety, and depression of full-time students of the Faculty of Pharmacy - Ho Chi Minh City University of Medicine and Pharmacy from year 1 to 5	990	A cross-sectional survey, interview with DASS - 21 questionnaires. (n=990)	<ul style="list-style-type: none"> <li>- It has been shown that symptoms of stress, anxiety and depression were recognised in 48.08%, 68.79%, 52.63% of students, respectively.</li> <li>- The percentage of students with stress, anxiety and depression has been shown to be highest in first-year students and lowest in the final-year students.</li> </ul>	The prevalence of stress, anxiety and depression among regular students of Pharmacy Faculty - University of Medicine and Pharmacy, Ho Chi Minh City are quite high and affected by many factors. For example, participating in monitoring and social relationships with friends positively affect the above three conditions. The activities such as social activities, clubs, and sports...need to be enhanced to help students adapting to university environment, especially for first - years students.
Tran Thi Hien and et al [4]	The status of depression among 862 final-year formal students of majors at Thai Nguyen School of Medicine and Pharmacy in 2020-2021 and associated factors	862	Descriptive cross-sectional study and multivariate regression analysis	The rate of depression among final-year regular students was 42.0%, in which mild level accounted for the highest rate 15.4%, followed by moderate level accounted for 14.6%, severe degree accounted for 5.8% and very severe 6.1%.	<ul style="list-style-type: none"> <li>- The rate of depression among final year students is still high</li> <li>- Multivariate logistic regression results showed that four factors positively that affect students' depression included sharing problems with parents, friends, stress and anxiety and status of students.</li> </ul>
Nguyen Thi Minh Ngoc et al [5]	Determining the rate and associated factors to depressive symptoms by a general practitioner at Hai Phong University of Medicine and Pharmacy.	511	A cross-sectional study on 511 students at Hai Phong University of Medicine and Pharmacy in 2016	Results showed that the proportion depressive symptoms of students were 37%. The proportion of depressive symptoms of the 1st year, 2nd year, 3rd year, 4th year, 5th year, 6th year were 36.6%; 34.0%; 36.8%; 40.4%; 34.7% and 38.7%	<ul style="list-style-type: none"> <li>- Students living in campus's hostel having signs of depression occupied 37.5%.</li> <li>- There is association between risk of depressive symptoms and stressful events in the life, personal factors, study related factors.</li> </ul>
Nguyen Thi Huyen Anh et al [6]	Prevalance and risk factors of depression among sixth year medical students in Hanoi Medical University	168	Cross-sectional descriptive study, using the PHQ-9 questionnaire to assess depression	<ul style="list-style-type: none"> <li>- The prevalence of depression among sixth year medical students was 20.2%.</li> <li>- The rate of depression in HMU sixth year medical students was higher compared to other previous studies in the world.</li> </ul>	<ul style="list-style-type: none"> <li>- There was no statistically significant difference between male and female.</li> <li>- Academic motivation (OR = 2.99; p = 0.007) and the average number of night shifts per week (OR = 4.57; p &lt; 0.001) increased the risk of depression. Type of housemate, overtime work, alcohol drinking and smoking status were factors non-associated with possible depression.</li> </ul>

Nguyen Thi Huyen Anh et al [7]	Survey on the rate of depression among students of grades Y4, Y5, Y6 of the General Practitioner program at Hanoi Medical University in 2015 and factors affecting the risk of depression.	627	A cross-sectional study was conducted on 627 medical	<ul style="list-style-type: none"> <li>- The prevalence of depression among HMU medical students (fourth, fifth, sixth year) was 15.2%.</li> <li>- The rate of depression in HMU medical students was quite similar to other previous studies in the world.</li> </ul>	<ul style="list-style-type: none"> <li>- There was statistically significant difference among academic year (<math>p = 0,039</math>). Perceived financial burden (<math>OR = 0,45</math>; <math>p = 0,002</math>), academic motivation (<math>OR = 3,77</math>; <math>p = 0,002</math>) and the average number of night shifts per week (<math>OR = 1,95</math>; <math>p = 0,011</math>) increased the risk of depressive symptoms..</li> <li>- Gender, type of housemate, overtime work, alcohol drinking and smoking status were factors non-associated with possible depression.</li> </ul>
Nguyen Thi Huong, et al. [8]	Health behaviors and risk of depression from second year students of national trade univeristy	400	Cross-sectional study was applied in 400 second year students by self-filled questionnaire (questionnaires related to health behaviors were developed and the CESD depression risk scale)	<ul style="list-style-type: none"> <li>- The health behaviors of student were as following: drinking rate was 48.8%, 8.8% smoking, drug use was 3.2%; the percentage of students at risk of depression was 49.5%</li> <li>- Some factors related to stress in students are starting university courses 85.5%, many new responsibilities 84.8%,...</li> </ul>	Students are experiencing many problems related to health behavior, stress and the risk of depression during the first years of college, so there needs to be proper attention to students' health.
Bui Mai Thi et al [9]	Determine the rate of depressive disorder, rate of suicidal ideation or behavior and associated factors among first and last year students at Hanoi Medical University.	1723	Cross-sectional study on 1723 students using Patient Health Questionnaire 9	The results showed that the rate of depressive disorders in students was 17.4% (95% CI: 15,6% - 19,4%); The rate of suicidal ideation and behavior is 26.2% (95%CI: 24,12% - 28,48%).	<p>The rate of depression and the rate of suicidal ideation and behavior among students shows a clear need to improve the environment and psychological support system for students at training institutions.</p> <p>The likelihood of having signs of depression was statistically significantly higher in the group of students with financial burden (<math>PR=2.07</math>; 95%CI:1.53-2.93) and a history of chronic illness calculated (<math>PR=1.44</math>; 95%CI:1.09-1.89); group with financial burden (<math>PR=1.70</math>; 95%CI: 1.09-1.78). The likelihood of suicidal ideation is higher in women (<math>PR=0.69</math>; 95%CI:0.55-0.84); Group with financial burden (<math>PR=1.39</math>; 95%CI=1.09-1.78), with a history of chronic disease (<math>PR=1.70</math>; 95%CI=1.39-2.09 )</p>
Phung Quoc Diep et al [11]	<ul style="list-style-type: none"> <li>- Comparing the prevalence of depression, anxiety and stress in formal nursing college students in courses at Bach Mai Medical College in 2021.</li> <li>- Analysis of associated related to depression, anxiety and stress among formal nursing college students at Bach Mai Medical College in 2021</li> </ul>	488	Cross-sectional descriptive study on 488 full-time nursing college students, Bach Mai Medical College, interviewed using the DASS-21 scale.	<p>The rate of students suffering from depression, anxiety, and stress is 8.2%; 10.1%; 4.5%.</p> <p>The rate of depression, anxiety, and stress are highest in the first year. The rate of depression, anxiety, and mild stress is the highest.</p>	Potential risk factors for depression, anxiety and stress include: First-year students; family economic difficulties; average or weak academic performance; dissatisfied with the major; drinking alcohol, smoking cigarettes/pipe tobacco; ending a close relationship (friendship); have disagreements with parents.
Nguyen Bich Ngoc, et al. [12]	Describe the stress situation of nursing students	300	Cross-sectional descriptive study on 300 students using Depression Anxiety Stress Scale 21 (DASS) and stressors in Nursing Students (SINS)	<ul style="list-style-type: none"> <li>- The results show that 47.3% of students suffer from stress, of which the levels of mild, moderate, severe and very severe stress are 15.3%, 19%, 8.7% and 4.3% respectively.</li> <li>- Second-year nursing students have the highest rate of stress (51%), followed by third-year students (47%), and the lowest is first-year students (44%).</li> </ul>	Students feel the most stress is financial issues, followed by academic issues, clinical practice environment and personal issues. Schools and families should take measures to reduce stress in nursing students.

## Discussion

### Sociodemographic Characteristics of Participants

Table 2 shows the depression rate of medical and pharmacy students in a number of Vietnamese studies, showing that the depression rate of students is increasing, and this rate is quite consistent with quantitative studies, previously, most domestic and foreign studies showed that the rate of students suffering from depression was very high during their school years [12-14]. This is explained by the large amount of knowledge, dense class schedule as well as the unique nature of the major. Medical and Pharmacy students are often more likely to show signs of stress, anxiety, and depression than other majors [10]. In fact, pharmacy students are said to be at risk of experiencing more stress than medical students. The proportion of full-time pharmacy students shows signs of stress, anxiety and depression respectively are 16.4%, 29.8% and 38.8%; of which the rate of severe anxiety accounts for 6%, severe depression accounts for 0.7% [9].

### Depression Characteristics of Research Subjects

The rate of symptoms of depression in students in 11 studies is increasing, the rate of students suffering from depression is very high throughout the school years, consistent with the research of Nguyen Thi Huyen Anh et al (15.2%) also used the same PHQ-9 toolkit [11,14] but much lower than two other studies by Tran Quynh Anh (43.2%; 38.9%) and Nguyen Huu Minh Tri, Nguyen Tan Dat (2017) using the CES-D toolkit [11,12]. Big difference probably comes from the nature of the three toolkits and the author's choice of assessment scale: - According to three studies on the application of PHQ [5,6,15] and CES-D kit [1,11,12] designed for screening and primary care support, not have much clinical significance in diagnosing depression. At the same time, at the evaluation point chosen by author Tran Quynh Anh (CES-D  $\geq 16$ ), the CES-D toolkit has a sensitivity of 87% and a specificity of 70%, and this toolkit can have the balance between sensitivity and specificity is better if the higher assessment score CES-D  $\geq 20$ . - Meanwhile, the PHQ-9 toolkit has been tested and shown to be flexible and accurate across many different countries and cultures and has relatively good diagnostic value when taking 10 as Depression assessment benchmark with sensitivity of 80% and specificity of 92% [5,6,15]. The DASS toolkit was used in the study of 134 formal pharmacy students at Lac Hong University and Eastern Technology, Dong Nai in the 2019-2020 school year, with the highest percentage of students showing signs of anxiety (38.8%), followed by depression (29.8%) and finally stress 16.4% [9]. This result is like the two authors Nguyen Bich Ngoc and Nguyen Van Tuan in 2020, 47.3% of nursing students at Hai Phong Medical College suffered from stress [14].

The rate of depression in senior students at Thai Nguyen University of Medicine and Pharmacy is 42% [16]. Besides, this rate is lower than research on stress, anxiety, and mild depression in students at Ho Chi Minh City University of Medicine and Pharmacy is 48.8%,

68.79%, 52.63% [10]. Three studies mentioned above all used the DASS-21 scale on students in different provinces and cities, which will have differences in culture, lifestyle, training programs, and different learning pressures that can lead to differences in stress rates and stress levels of students between studies. Limitations of three studies using the DASS-21 scale to screen students for stress without clinical examination and diagnosis by specialists [9,10,17].

### Associated Factors to Depression in Research Subjects

**Associated Factors to Depression in Research:** Medical majors, high academic pressure, poor family circumstances, orphans, overtime work, academic results by school year, social relationships, family status... However, Research on 300 nursing students in freshman to third-year students at Hai Phong Medical College. Stress levels and sources of stress are divided into 4 groups causing stress from high to low: family finances, results learning, clinical practice environment and personal issues [17]. The group without financial difficulties had a lower risk of depression than the group with financial difficulties (OR = 0,45; p = 0,002). This result is like previous studies [15]. In the study Nguyen Bich Ngoc and Nguyen Van Tuan used the Stressor in Nursing Students scale (SINS) to show that students felt the most stress due to financial problems, followed by learning problems and clinical practice environment and personal issues. Financial results show that financial problems are one of the sources of stress, anxiety, and depression in many studies [1,5,6,14]. The rate of depression varies between years of study and gradually increases with the difficulty of the training program (sixth year > fourth year > fifth year). We explain that because the fourth-year curriculum includes many important subjects (internal medicine, surgery, obstetrics, pediatrics, diagnostic imaging...) and the clinical study time is longer, students have a higher rate of Depression is higher than fifth year. The sixth-year student block has the highest depression rate because sixth year students are under more pressure (reviewing and taking boarding exams, reviewing, and graduating exams, defending their thesis...) than fourth year and fifth year students [6].

Medical students must endure a lot of pressure in their studies and career specifics. Freshman and second year medical students often have difficulty communicating, making friends, and getting used to the university environment. Third- and fourth-year students begin to gradually get used to being on duty at the hospital. this duty schedule requires a scientific arrangement of time for eating, sleeping, resting, and studying. Students in fifth year and sixth year are under the most pressure for knowledge, they must prepare enough knowledge to graduate and find a job. With such characteristics, there are many causes leading to depression in medical students [18]. However, sophomore in the nursing student group of Hai Phong Medical College have the highest stress rate with 51%, followed by junior with 47% and fresh man with 41%, due to the college study program, from the second year, nursing students begin to do clinical internships at hospitals in addition to their time studying at school. The two biggest

sources of stress are “Fear of failing the course”, “exams and grades” with the highest SD of 3.5 and 3.15. The fact that students rated many health impacts was not a factor related to the risk of depression. However, the group of students on duty  $\geq 2$  sessions/week will be nearly 2 times more likely to have depression than the group on duty less than 2 sessions/week. We explain this difference because being on duty affects students’ health. Normally, before and after each shift, students still must go to theoretical and clinical classes at the hospital, so they don’t have much time to rest.

In addition, being on duty so much makes medical students not have much time for entertainment or social activities [6]. One of the limitations of these 11 research is that the diagnosis of depressive syndrome is only based on a screening questionnaire without clinical examination. In addition, the study design was cross-sectional so the cause-and-effect relationship between depression and influencing factors could not be assessed [17]. The results obtained from the scale are not meaningful in diagnosing depression, but only serve as an initial screening of subjects showing signs of stress, anxiety, and depression. It is necessary to choose at least two measurement scales to diagnose and compare the results with each other [18]. For example, research by Nguyen Bich Ngoc and Nguyen Van Tuan on students at Hai Phong Medical College used the SINS scale [17]. In addition, the study of Nguyen Thi Huyen Anh et al used the Academic Motivation Scale (AMS) questionnaire to assess learning motivation. The learning motivation score is calculated according to the Self-Determination Index (SDI) with values ranging from -18 to +18. Students with Learning Motivation (SDM) have  $SDI \geq 0$ , students without learning motivation (non-SDM) have  $SDI < 0$  [6,15].

## Conclusion and Recommendations

### Regarding the Training Program

Identify early the proportion of students susceptible to mental disorders to promptly intervene, helping to reduce learning pressure. At the same time, it helps develop common standards required by the medical and pharmaceutical industries to deal with different aspects of life, especially the stage of preparation for graduation [9]. Schools should re-distribute the curriculum to different years to avoid overloading many subjects during a school year [4].

- **For students at Medical Schools:** encouraging participation in social activities will contribute to improving this psychological disorder [4,10].
- **Regarding Relationships with Friends and Family:** regularly talk and share with friends and family to relieve pressure and stress during the study and exam process.
- **Regarding Students:** should learn how to control and relieve their emotions, avoid suppressing emotions that cause stress and putting pressure on themselves [4].
- **Regarding Parents:** should limit pressure, share regularly,

and create a comfortable mentality and passion for learning for their children [4].

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