



Prevalence of depressive symptoms among hypertensive patients: A PHQ-9 assessment at Vietnam-Cuba Friendship Hospital, Dong Hoi

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ABSTRACT

Objectives: This study aimed to assess the severity of depressive symptoms and identify factors associated with depressive symptoms among hypertensive patients at the Cardiology Department, Vietnam-Cuba Friendship Hospital, Dong Hoi, Quang Binh. **Participants and Method:** A cross-sectional descriptive study was conducted among 294 hypertensive patients aged ≥ 18 years, who had been diagnosed and treated for at least three months based on the Vietnamese classification of hypertension. The Patient Health Questionnaire-9 (PHQ-9) was used to assess depressive symptoms. Statistical analyses were performed using SPSS version 16.0, with *t*-tests and ANOVA applied to examine associations between depression symptoms and relevant factors ($p < 0.05$ was considered statistically significant). **Results:** The findings revealed that 46.5% of hypertensive patients exhibited depressive symptoms, with an average PHQ-9 score of 10.11 ± 5.13 . Among them, 26.5% had mild depressive symptoms, 13.9% had moderate symptoms, and 6.1% had severe depression. Significant factors associated with depressive symptoms included age, gender, marital status, duration of hypertension treatment, and comorbidities ($p < 0.05$). **Conclusion:** Nearly one in two hypertensive patients exhibited depressive symptoms, with the average severity classified as mild. These findings emphasize the importance of integrating routine depression screening into hypertensive patient care. Healthcare providers, especially nurses, should actively monitor the psychological well-being of hypertensive patients and implement targeted interventions to enhance overall patient outcomes.

Keywords: Depression symptoms, hypertensive patients, PHQ-9, mental health.

INTRODUCTION

Depression is one of the most prevalent mental disorders and a major contributor to the global disease burden. According to the World Mental Health Survey, depression ranks second only to ischemic heart disease in terms of disease burden and is projected to become the leading cause of

disability worldwide by 2030 ^{1,2}. Numerous studies have indicated that depression is particularly common among the elderly and has been increasing in prevalence globally. A systematic review and meta-analysis by Ting Hu et al. estimated the global prevalence of depression among older adults at 28.4%, underscoring its significant public health impact ³.

Hypertension, a major global health concern, affects more than 1.5 billion individuals worldwide, with four in every ten adults experiencing this condition^{4, 5}. Patients with hypertension are particularly vulnerable to comorbid mental health disorders, especially depression, which further exacerbates their disease burden at the individual, familial, and societal levels⁶. The interplay between hypertension and depression has been well-documented in various populations. For instance, a study conducted in China reported that 12.8% of elderly hypertensive patients exhibited clinically significant depressive symptoms, with prevalence rates of 5.3% and 32.8% among controlled and uncontrolled hypertensive patients, respectively⁷. Similarly, a study in Pakistan found that 40.1% of hypertensive patients had depression¹, while research in Morocco indicated that 56.1% reported depressive symptoms⁴.

In Vietnam, studies on depressive symptoms in hypertensive patients remain scarce. However, research by Nguyen Van Thong et al. revealed that the prevalence of depression in this population ranged from 26.8% to 46%⁸. Additionally, a study conducted by Nguyen Ba Nam et al. in Phong Dien District, Can Tho City, found that 22.4% of hypertensive patients exhibited depressive symptoms, with depression shown to exacerbate their hypertensive condition⁹.

Despite the increasing recognition of depression in hypertensive patients, research on its prevalence and associated factors remains limited in Vietnam. While studies have been conducted in certain regions, no research has specifically examined depressive symptoms in

hypertensive patients in Quang Binh province. This gap in knowledge hinders a comprehensive understanding of mental health comorbidities among hypertensive patients in this population.

To address this gap, this study aims to assess the severity of depressive symptoms and identify key factors associated with depressive symptoms in hypertensive patients at the Cardiology Department, Vietnam-Cuba Friendship Hospital, Dong Hoi, Quang Binh. By providing essential data on the prevalence and determinants of depressive symptoms, the findings of this study may contribute to the early detection, prevention, and management of depression in hypertensive patients, ultimately improving patient care and health outcomes.

RESEARCH PARTICIPANTS AND METHODS

Research participants: This study was conducted on hypertensive patients receiving treatment at the Department of Cardiology, Vietnam - Cuba Friendship Hospital, Dong Hoi, Quang Binh, Vietnam.

Inclusion criteria: Patients were eligible for inclusion if they met the following conditions:

Age \geq 18 years.

Diagnosed with hypertension according to Vietnam's hypertension classification.

Received antihypertensive treatment for at least three months prior to study enrollment.

Exclusion criteria: Patients were excluded if they:

Had a history of cerebrovascular accident (stroke) to prevent bias due to potential neurological, cognitive, auditory, or speech impairments.

Had hearing or speech disorders that could interfere with communication and data collection.

Research location and time: The study was conducted at the Department of Cardiology, Vietnam - Cuba Friendship Hospital, Dong Hoi, Quang Binh, Vietnam, from February 2024 to October 2024.

Research design: This study employed a cross-sectional design.

Research sample: The required sample size was determined using the formula for estimating a proportion in the population:

$$n = Z_{(1-\alpha/2)}^2 \frac{p(1-p)}{\Delta^2}$$

In which:

n: Minimum sample size required for the study.

$Z_{(1-\alpha/2)} = 1.96$ for a 95% confidence level ($\alpha = 0.05$)

$p = 0.224$ (proportion of hypertensive patients with depression in Can Tho City, based on a study conducted from 2017–2018 on 772 hypertensive patients, which recorded a prevalence of 22.4%)⁹.

Δ : Desired margin of error between the estimated sample proportion (p) and the true population proportion (P). In this study, $\Delta = 5\%$ (0.05) was selected.

Using this formula, the minimum required sample size was calculated to be 267 patients. Considering a potential 10% non-response or invalid responses, the final target sample size was adjusted to 294 patients.

Sampling method: An interval sampling method was employed to ensure a representative selection of participants.

The study was conducted over a 9-month period, with data collection scheduled for one day per week over 36 weeks, resulting in 36 study days.

To achieve the target sample size, an average of 8–9 patients was surveyed per study day (294 patients/36 study days \approx 8.1 patients per day).

At the Department of Cardiology, Vietnam - Cuba Friendship Hospital, Dong Hoi, Quang Binh, there are 15 treatment rooms. The sampling procedure was as follows:

- *On the first study day:*

+ A random selection of 10 out of the 15 treatment rooms was conducted.

+ A list of patients in each selected room was compiled.

+ One patient per room meeting the inclusion and exclusion criteria was randomly selected.

- *On subsequent study days:*

+ The same randomization procedure was applied.

+ Patients who had already participated were excluded from further selection to prevent duplication.

Research instruments: A structured questionnaire was utilized as the primary data collection tool, consisting of two main sections:

- *Part 1:* Participant characteristics and health Information

This section gathered demographic information (e.g., age, gender, qualification level, employment status, socioeconomic status) and health-related factors (e.g., duration of hypertension, medication adherence, comorbidities).

- *Part 2: Depression Assessment Using the Patient Health Questionnaire-9 (PHQ-9)*

+ The PHQ-9, developed by Dr. Spitzer et al., is a widely used screening tool for assessing depression severity and monitoring treatment response¹⁰. This scale consists of nine items, evaluating the frequency of depressive symptoms over the past four weeks. Each item is scored as follows:

0 points: "Almost never"

1 point: "A few days"

2 points: "More than half the time"

3 points: "Almost every day"

+ Based on the total score (range: 0–27), participants were categorized into four groups:

No depression: 0–9 points

Mild depression: 10–14 points

Moderate depression: 15–19 points

Severe depression: 20–27 points

+ A total score of ≥ 10 was considered indicative of clinically significant depression.

- *Reliability Testing:* The research instrument was pre-tested on 20 patients who were not included in the main study. The PHQ-9 scale demonstrated good internal consistency, with a Cronbach's alpha coefficient of 0.74 in this study.

Data collection method: A structured interview method was employed to collect data using the pre-designed questionnaire.

The study was conducted at the Department of Cardiology, Vietnam - Cuba Friendship Hospital, Dong Hoi, Quang Binh. The researcher approached participants during their hospital stay and explained the study objectives. Before participating,

each patient received detailed information about the study's purpose and procedures, and any questions were addressed by the researcher. Participants who voluntarily agreed to participate either self-completed the questionnaire or had it administered through an interviewer. Upon completion, the questionnaire was immediately returned to the researcher. The survey took approximately 15 minutes to complete, and participation was entirely voluntary, with no financial cost to the participants.

Data Processing and Statistical Analysis: Data analysis was performed using SPSS version 16.0. Descriptive statistics were used to analyze participants' demographics, mean scores, and standard deviations for depression levels. Independent t-tests and one-way ANOVA were conducted to examine associations between depression severity and demographic/clinical variables. All statistical tests were performed with a 95% confidence interval (CI), and a p-value < 0.05 was considered statistically significant.

Research ethics: This study was approved by the Scientific Research Council of Vietnam - Cuba Friendship Hospital, Dong Hoi (Decision No. 03/QD-HDKHCN, dated June 10, 2024). Prior to participation, all individuals received detailed information about the objectives, procedures, and design of the study. Informed consent was obtained from all participants, emphasizing that their involvement was entirely voluntary and that they could withdraw from the study at any time without any consequences. Confidentiality was strictly maintained, with all collected data anonymized and securely stored. The information obtained was accurate, objective, and used solely for research purposes, with no disclosure or application beyond the scope of this study.

RESULTS**Table 1. Characteristics of participants (n = 294)**

	Characteristic	n	%
Age group	18-49	63	21.4
	50-69	178	60.6
	≥ 70	53	18.0
Mean ± SD: 58.96 ± 10.47			
Gender	Female	148	50.3
	Male	146	49.7
Place of residence	Rural areas	271	92.2
	Urban areas	23	7.8
Qualification level	Illiterate	9	3.1
	Primary school	92	31.3
	Secondary school	89	30.2
	High school or higher	104	35.4
Occupation	Manual worker	208	70.7
	Non-manual worker	16	5.4
	Retired	49	16.7
	Unstable job/ living dependent on children	21	7.1
Marital status	Single	6	2.0
	Married	254	86.4
	Separated/divorced/widow	34	11.6
Health insurance status	With health insurance	273	92.2
	No health insurance	21	7.1
Blood pressure	Normal	6	2.0
	Grade I hypertension	85	28.9
	Grade II hypertension	203	69.0
	Mean ± SD (mmHg) Diastolic blood pressure (DBP): 74.01 ± 9.65 Systolic blood pressure (SBP): 163.98 ± 16.21		
BMI	Underweight	25	11.9
	Normal	232	78.9
	Overweight	24	8.2
	Obesity	3	1.0

		Characteristic	n	%
Duration of hypertension treatment		≤ 5 years	157	53.4
		5-10 years	74	25.5
Smoking status		Yes	110	40.1
		No	178	59.9
Alcohol consumption habit		Yes	102	37.5
		No	170	62.5
Comorbidity status		No comorbidities	73	24.8
		Having one comorbidity	119	40.5
		Having two comorbidities	58	19.7
		Having more than two comorbidities	44	15.0
Family history of hypertension		Yes	137	46.6
		No	157	53.4

Table 1 provides an overview of the study participants (n = 294). The mean age was 58.96 ± 10.47 years, with most (60.6%) in the 50–69 age group. Gender distribution was nearly equal, and the majority (92.2%) resided in rural areas. While 35.4% had completed high school or higher, 3.1% were illiterate. Manual laborers comprised the largest occupational group (70.7%), and most participants were married (86.4%) with health insurance coverage (92.2%).

Clinically, 69.0% had Grade II hypertension, while 28.9% had Grade I. The mean blood pressure was 163.98/74.01 mmHg. Most participants had a normal BMI (78.9%), though 11.9% were underweight, and only 1.0% were obese. Over half (53.4%) had been on hypertension treatment for ≤ 5 years.

Regarding lifestyle, 40.1% were smokers, and 37.5% consumed alcohol. Comorbidity analysis showed that 40.5% had at least one additional condition, while 15.0% had two or more. Additionally, 46.6% had a family history of hypertension, highlighting potential genetic risk factors.

Table 2. Level of depressive symptoms among participants (n = 294)

Depression level	n	%
No depressive symptoms	157	53.5
Mild depressive symptoms	78	26.5
Moderate depressive symptoms	41	13.9
Severe depressive symptoms	18	6.1
Mean depression score (Mean ± SD)	10.11 ± 5.13	

Table 2 presents the distribution of depressive symptoms among participants. Overall, 46.5% of the patients exhibited depressive symptoms, with 26.5% experiencing mild depressive symptoms, 13.9% experiencing moderate depressive symptoms, and 6.1% experiencing severe depressive symptoms. The mean depression score was 10.11 ± 5.13.

Table 3. Association between characteristics of hypertensive patients and depressive symptoms (n = 294)

Content		Depressive symptoms	F/t	p
		Mean ± SD		
Age group	(I) 18-49	8.84 ± 5.07	3.13 ^F	0.045 (I) (II) < (III)
	(II) 50-69	10.25 ± 5.00		
	(III) ≥70	11.15 ± 5.39		
Gender	Male	9.50 ± 5.44	-2.04 ^t	0.042
	Female	10.71 ± 4.74		
Place of residence	Rural areas	10.18 ± 4.99	-1.81 ^t	0.083
	Urban areas	8.05 ± 5.20		
Qualification level	Illiterate	10.44 ± 3.84	6.49 ^F	0.081
	Primary school	8.22 ± 4.44		
	Secondary school	10.89 ± 5.37		
	High school or higher	11.09 ± 5.89		
Occupation	Manual worker	9.64 ± 5.01	4.78 ^F	0.3
	Non-manual worker	13.56 ± 6.07		
	Retired	11.51 ± 4.90		
	Unstable job/ living dependent on children	8.90 ± 4.72		
Marital status	(I) Single	14.67 ± 8.38	3.36 ^F	0.036 (II) < (I), (II) < (III)
	(II) Married	9.87 ± 4.93		
	(III) Separated/divorced/widow	11.11 ± 5.58		
Health insurance status	With health insurance	9.91 ± 4.99	-2.38 ^t	0.18
	No health insurance	12.67 ± 6.22		

(^t. T-test; ^F. Anova test)

The results in Table 3 indicate a statistically significant difference between age ($F = 3.13$, $p = 0.045$), gender ($t = -2.04$, $p = 0.042$), and marital status ($F = 3.36$, $p = 0.036$) in relation to the mean depressive symptoms score among hypertensive patients.

There was no statistically significant difference between place of residence ($p = 0.083$), qualification level ($p = 0.081$), occupation ($p = 0.3$), or health insurance status ($p = 0.18$) ($p > 0.05$) and mean depression symptoms score among hypertensive patients.

Table 4. Health parameters of hypertensive patients related to signs of depression (n = 294)

Content		Depressive symptoms Mean \pm SD	F/t	P
Blood pressure	Normal	8.86 \pm 0.81		
	Grade I hypertension	10.54 \pm 5.67	0.61F	0.55
	Grade II hypertension	9.97 \pm 4.96		
BMI	Underweight	10.37 \pm 5.52		
	Normal	10.27 \pm 5.14	1.64F	0.178
	Overweight	8.79 \pm 4.32		
	Obesity	5.00 \pm 1.73		
Duration of hypertension treatment	(I) \leq 5 years	11.78 \pm 5.58		0.004
	(II) 5-10 years	9.67 \pm 4.98	5.57F	(I) > (II)
	(III) >10 years	9.25 \pm 4.53		(III)
Smoking status	Yes	9.36 \pm 5.18	- 3.10	0.021
	No	11.23 \pm 4.87		
Alcohol consumption habit	Yes	9.66 \pm 5.42	-1.21	0.2261
	No	10.41 \pm 4.91		
Comorbidity status	(I) No comorbidities	8.42 \pm 3.85		
	(II) Having one comorbidity	9.50 \pm 9.50		0.0002
	(III) Having two comorbidities	9.83 \pm 9.83	6.17	(I) < (II)
	(IV) Having more than two comorbidities	11.51 \pm 5.14		(III)(IV)
Family history of hypertension	Yes	10.73 \pm 5.67	1.96	0.0541
	No	9.57 \pm 9.57		

(^t. T-test; ^F. Anova test)

The results indicated a statistically significant difference in the mean depressive symptom score of hypertensive patients based on treatment duration ($F = 5.57$, $p = 0.004$), smoking status ($t = -3.10$, $p = 0.02$), and comorbidities status ($F = 6.17$, $p = 0.000$).

No statistically significant difference was observed between blood pressure parameters, BMI, alcohol consumption habits, and family history of hypertension ($p > 0.05$) and the mean depressive symptom score of patients.

DISCUSSION

Prevalence of depressive symptoms in hypertensive patients

The findings of this study indicate that 46.5% of hypertensive patients exhibited depressive symptoms, with a mean depression score of 10.11 ± 5.13 . This prevalence is notably higher than reported in previous studies conducted in various provinces of Vietnam. For instance, a study by Ly Thi Phuong Hoa (2009) on outpatients with hypertension at Nguyen Tri Phuong Hospital found a prevalence of depressive symptoms of 26.5%¹¹. Similarly, research by Nguyen Ba Nam et al. on 722 hypertensive patients in Can Tho city reported a lower prevalence of 22.4%⁹. The higher rate observed in the present study may be attributed to differences in study populations, as the current research focused on hospitalized hypertensive patients, whereas the aforementioned studies involved outpatients and community-based populations. Hospitalization-related factors such as disease severity, medication adjustments, and stress associated with inpatient care could contribute to the increased prevalence of depressive symptoms. The prevalence observed in this study aligns with findings from other Vietnamese studies. According to Nguyen Van Thong et al., the rate of depressive symptoms among hypertensive individuals ranges from 26.8% to 46%⁸. Additionally, a study by Ademola in Ghana and Nigeria identified medication-related anxiety and poor blood pressure control as significant predictors of depressive symptoms among hypertensive patients¹². These findings suggest that the interplay between hypertension management and psychological distress may be an important

factor influencing mental health outcomes in this population.

When compared to international studies, the prevalence found in this study is higher than that reported by Xue in China, where only 12.8% of hypertensive patients exhibited depressive symptoms⁷. A systematic review by Li et al. estimated the prevalence of depressive symptoms among hypertensive patients at 29.8% when assessed using self-reported scales¹³. However, other studies have reported rates comparable to or higher than those found in the present study. For instance, Stanetic et al (2017) observed depressive symptoms in 46% of hypertensive patients undergoing treatment¹⁴, while Ashok et al (2019) reported a prevalence of 41% in Kanyakumari, India¹⁵. Similarly, research by Samar Mahmood et al. (2017) in Pakistan on 165 hypertensive patients found a depressive symptoms rate of 40.1%¹. Higher prevalence rates have also been documented in certain regions. Sandra et al (2018) reported a prevalence of 54.9% among hypertensive patients in Southern Nigeria, while Boukhar et al (2022) found that 56.1% of hypertensive patients in Morocco experienced depressive symptoms. Such variations may be explained by differences in sociocultural factors, healthcare accessibility, and genetic predispositions. Additionally, a temporal analysis by Dutta et al. indicated an increasing trend in the prevalence of depressive symptoms, with higher rates reported in studies published from 2020 to 2023 (52.6%) compared to those from 2016 to 2019 (35.5%)¹⁶. These findings suggest that the rising burden of mental health issues among hypertensive patients may reflect broader global health trends.

Overall, the results of this study are consistent with global research trends and underscore the significant burden of depressive symptoms in hypertensive patients. The findings highlight the need for integrated healthcare strategies that address both the physical and psychological well-being of individuals with hypertension.

Factors associated with depressive symptoms in hypertensive patients

This study identified several factors significantly associated with depressive symptoms in hypertensive patients, including age, gender, marital status, duration of hypertension treatment, and the presence of comorbidities.

Association Between Age and Depressive Symptoms

The study findings indicate a significant association between age and depressive symptoms in hypertensive patients, with older individuals (≥ 70 years) exhibiting higher depressive symptom scores compared to younger patients. This trend is consistent with previous research, including studies by Nguyen Ba Nam in Can Tho, Mahmood in Pakistan, and Xue et al. in China, all of which reported an increased risk of depression with advancing age^{1, 7, 9}. Li et al. further quantified this relationship, showing that for every 1% increase in the average age of hypertensive patients, the risk of depression increased by 4.83%¹³. Additionally, Sandra et al. highlighted that depression prevalence among older adults is rising in developing countries, where mental health services are primarily focused on younger populations¹⁷. In Vietnam, elderly individuals (≥ 70 years) often face significant life changes, including deteriorating health, financial dependence on their children, and fears of becoming

a burden, all of which may contribute to the increased prevalence of depressive symptoms in this age group⁹.

Association between gender and depressive symptoms

Female patients had a significantly higher prevalence of depressive symptoms than their male counterparts, aligning with findings from previous research. Nguyen Ba Nam's study indicated that women were 1.78 times more likely to experience depression than men⁹, while Ashok et al. reported that the risk of depression in women was 2.063 times higher than in men¹⁵. The underlying causes of this gender disparity remain unclear but may be attributed to hormonal fluctuations associated with pregnancy, postpartum, and menopause, as well as genetic predisposition. Additionally, gender-specific social roles, such as childcare responsibilities and household management, may contribute to increased stress and depressive symptoms among women⁹.

Association between marital status and depressive symptoms

Marital status was found to be significantly associated with depressive symptoms, with married patients exhibiting lower depressive symptom scores compared to single individuals or those with marital problems. This finding is consistent with studies by Nguyen Ba Nam, Li, and Mahmood^{1, 9, 13}, which suggest that individuals living with a supportive spouse are better equipped to manage stress and psychological distress. Conversely, individuals without a stable marital relationship may experience heightened feelings of loneliness and emotional vulnerability, contributing to an increased risk of depression⁹.

Association between duration of hypertension treatment and depressive symptoms

The study found a significant relationship between the duration of hypertension treatment and depressive symptoms, with patients receiving treatment for less than five years exhibiting higher depressive symptom scores than those undergoing treatment for a longer period. This finding is consistent with Ly Thi Phuong Hoa's study ¹¹, which suggests that anxiety is more prevalent in the early stages of hypertension diagnosis, particularly among elderly individuals in rural areas who may have limited knowledge about disease management. However, some studies have reported an opposite trend, indicating that patients with longer disease duration may experience increased depression due to the chronic nature of their condition and reduced hope for complete recovery ^{1,18}. These conflicting findings suggest that the relationship between disease duration and depression is complex and influenced by multiple factors, warranting further investigation.

Association between comorbidities and depressive symptoms

The presence of multiple comorbidities was significantly associated with higher depressive symptom scores, highlighting the psychological burden of managing multiple chronic illnesses. This finding aligns with Hamrah's study in Afghanistan, which found that hypertensive patients with two or more comorbidities were approximately four times more likely to experience depression and anxiety compared to those with hypertension alone ¹⁹. Patients with multiple chronic conditions often face uncertainty about their prognosis, increased healthcare needs, and a reduced

quality of life, all of which contribute to heightened psychological distress and the development of comorbid anxiety-depression syndromes¹⁹.

Previous studies have identified rural residency ⁶, low education levels⁴, and lifestyle factors such as smoking and excessive alcohol consumption ⁹ as contributors to depressive symptoms in hypertensive patients. However, this study found no significant association between these factors and depression. This inconsistency may stem from variations in study populations, research methodologies, or sample sizes.

Several limitations should be acknowledged. The study relied on the PHQ-9 self-assessment questionnaire, which, while widely used, was not supplemented with clinical evaluations to confirm depression diagnoses. Additionally, as the sample was drawn from a single hospital, the generalizability of findings to the broader population of Quang Binh province may be limited. However, since the Vietnam-Cuba Friendship Hospital Dong Hoi serves patients from diverse geographic areas, the sample remains reasonably representative. Finally, the cross-sectional nature of the study prevents establishing causality or determining the temporal relationship between hypertension diagnosis and the onset of depressive symptoms. Despite these limitations, the findings align with global research trends and contribute to the growing body of evidence on the intersection between hypertension and mental health. Further longitudinal studies are needed to explore the causal mechanisms underlying these associations and to develop targeted interventions for improving mental health outcomes in hypertensive patients.

CONCLUSION

Nearly half of hypertensive patients attending follow-up exhibited signs of depression, with the mean depressive symptom score falling within the mild range. Depressive symptoms were significantly associated with age, gender, marital status, duration of hypertension treatment, and comorbidities. Nurses should prioritize mental health assessment and support for hypertensive patients, particularly the elderly, socially isolated individuals, and those recently diagnosed with hypertension.

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