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Prevalence of depression among heart failure inpatients and its associated socio-demographic factors: implications for personal-and family-based treatment management in health facilities in Vietnam

N.-N. TRAN[1,2,3], V.-S. BUI[1,2,3], V.-H. NGUYEN[1,2], T.-P.-N. HOANG[3,4,5], H.-L. VO[6], H.-T. NGUYEN[7], M.-T. DUONG[1,2]

[1]Department of Psychiatry, Hanoi Medical University, Hanoi, Vietnam
[2]National Institute of Mental Health, Bach Mai Hospital, Hanoi, Vietnam
[3]Hanoi Medical University Hospital, Hanoi Medical University, Hanoi, Vietnam
[4]Department of Geriatrics, Hanoi Medical University, Hanoi, Vietnam
[5]Department of Cardiology, National Geriatric Hospital, Hanoi, Vietnam
[6]Institute for Preventive Medicine and Public Health, Hanoi Medical University, Hanoi, Vietnam
[7]Office of Postgraduate Management, Hanoi Medical University, Hanoi, Vietnam

Abstract. – OBJECTIVE: Our objective is to identify the prevalence of depression among inpatients with heart failure (HF), and to ascertain the factors associated with the depression from a wide spectrum of sociodemographic variables.

MATERIALS AND METHODS: We conducted a hospital-based cross-sectional survey of prospectively collected data in inpatients with a diagnosis of HF at Vietnam National Heart Institute, Bach Mai Hospital (Hanoi, Vietnam) from July 2020 to July 2021. A sample size of 128 inpatients with HF was finally included. Primary outcome variable was depression ICD-10.

RESULTS: The mean age was 62.34 (SD = 14.76). The sex ratio was 66 males to 62 females. The overall prevalence of depression ICD-10 was 46.88% among HF inpatients. The proportion of the depressed patients fluctuated between 37.21% and 83.33% by NYHA heart failure classification. Compared to the depressive prevalence among patients with NYHA class II, the odds were 8.43 times higher for those with NYHA class IV (OR univariate 8.43; 95% CI 1.63-43.46). Patient's age was significantly associated with increased prevalence of depression (OR multivariate 1.07; 95% CI 1.003-1.14). It was significantly higher odds of depression in HF patients who felt sadness after a diagnosis of an illness (OR multivariate 18.02, 95% CI: 4.21-77.08). Individuals with higher household economic status were less likely to be diagnosed with depression compared to those with lower household economic status (OR multivariate 0.15, 95% CI: 0.02-0.92). The odds of depression were significantly higher in HF patients who reported with family conflict (OR multivariate 23.45, 95% CI: 1.29-423.55), and in those having the loss of a close family member (OR multivariate 38.62, 95% CI: 1.41-1055.98).

CONCLUSIONS: The prevalence of depression by ICD-10 was relatively high. Age of patient, sadness after a diagnosis of an illness, household economic status, family conflict and loss of a close family member were significantly associated with the depression among HF inpatients. Present results suggest a need for a disease management program addressing both psychological and HF aspects with the aim of improving health outcomes for the inpatients in Vietnam health facilities.

Key Words:
Depression, Heart failure, Stress factor, Sociodemographic.

Introduction

Heart failure (HF), the final stage of various heart disease, known to be a syndrome characterized by left ventricular dysfunction, exercise intolerance, reduced Quality of Life (QOL), and markedly shortened life expectancy[1,2]. Depression is not only the prevalent psychological complication mainly contributing to the rehospitaliza-

Corresponding Authors: Minh-Tam Duong, MD, Ph.D; e-mail: duongminhtam@hmu.edu.vn
Thi-Phuong-Nam Hoang, MD; e-mail: Hoangthiphuongnam@hmu.edu.vn

tion and death in HF patients as well as impaired QOL[3-6]. Hence, clinicians and researchers still consider the depression as an important outcome to evaluate HF therapy. A variety of current evidence[3,7] showed the association between depression and HF. The most recent systematic review[3] indicated the overall prevalence of depression among HF patients has been increasing globally in recent years, with the 1.5 times higher prevalence in women compared to men. The prevalence of this psychological problem was higher in countries with low economic income (56.7%) than high-income countries (39.2%)[3].

Despite the negative effects of comorbid depressive symptoms in HF patients, depression was frequently unrecognized and undetected in people with HF because many of the physical symptoms are similar to those of HF. Sometimes a patient's sadness is perceived by doctors, caregivers and even the patient as a normal response of someone who is suffering from a chronic physical illness. Therefore, most of the symptoms of depression in them have not been diagnosed, especially clinical practice condition in Vietnam hospitals. The number of studies on depressive symptoms in HF patients was growing in some countries in Asia, but relatively little is known about depression in Vietnamese patients with HF and no adequate publication was reported from Vietnam. To the best of our knowledge, there are no intervention programs for this psychiatric problem in HF inpatients in lower middle income countries, as well as in resource-scare hospital settings. The purpose of this study was, therefore, to identify the prevalence of depression among inpatients with HF, and to ascertain in this population associated factors for the depression from a wide spectrum of sociodemographic variables, thereby, elaborating implications for personal and family-based management in health facilities.

Patients and Methods

Study Design and Setting

From July 2020 to July 2021, a cross-sectional survey was conducted on inpatients with a diagnosis of HF at Vietnam National Heart Institute, Bach Mai Hospital (Hanoi, Vietnam). The patients with HF of both sexes who met the following inclusion criteria were included:

- Having the ability to understand, read, speak, and write in Vietnamese.
- Patients of both sexes at the age of 18 years or above.
- Received inpatient treatment at Vietnam National Heart Institute, Bach Mai Hospital.
- Previously diagnosed with HF.

This single-centre study was approved by Institutional Review Board of Hanoi Medical University. All study patients with HF were voluntary, and they could leave the study at any time. Informed consent was obtained from all subjects in a language that they understood (Vietnamese language) and their signature.

Sample Size and Sampling

The sample size of the study was calculated according to the following formula.

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

n: number of participants, Z(1-a/2) = 1.96 (confidence interval: 95%), d: 0.09, p = 48.5% which was recorded prevalence of depression among HF patients[8]. The research sample size was calculated as 118. Finally, a total of 128 patients with HF were recruited. A convenient sampling was applied for the cohort of HF inpatients.

Outcome Variable

Our outcome variable was depression ICD-10 in a population of HF patients. Among 128 patients with HF, those with depression had a definitive diagnosis according to ICD-10 depression diagnostic criteria[9] by three general practitioners known as the psychiatrists (Dr. N.-N.T., Dr. V.-S.B. and Dr. V.-H.N.) with 10 years of experience. 128 patients were contacted by phone to schedule a consultation and a face-to-face interview. The data of sociodemographic factors and stress factors were collected during the same interview by a group of psychiatrists and public health experts.

Data Analysis

All analyses were performed with a software program (Stata® 15; StataCorp LLC, College Station, TX, USA). First, descriptive statistics was applied for the sociodemographic profile of the sample. Second, depressive prevalence of the study sample was calculated with the frequency and percentage according to New York Heart

Association (NYHA) heart failure classification. Then, difference in the proportion of depression by NYHA classification was examined by χ^2 test and their association was identified with an univariate logistic regression analysis. Third, difference in selected study characteristics between non-depressed group and depressed group were examined by χ^2 test and Fisher's exact test. Finally, a multivariate model with logistic regression was utilized for analyzing the factors associated with ICD-10 depression. We set the level of statistical significance at 0.05.

Results

As shown in Table I, more than half of respondents aged 60 years old or over (59.38%). The mean age was 62.34 (SD = 14.76). The sex ratio for the entire sample size was 66 males to 62 females. Only 18.75% patients graduated from college/tertiary and higher. 75.78% of the patients married, and 20.31% of them widowed. The majority of patients was Kinh ethnicity (89.84%). By household's wealth status, the proportion of the poor, the average and the wealthy were 17.19%,

Table I. Sociodemographic profile of study patients with heart failure (N = 128).

	Patients	%
Age ≥ 60		
No	52	40.62
Yes	76	59.38
Age (years) – Mean; SD (IQR)	62.34; 14.76 (24-92)	
Gender		
Male	66	51.56
Female	62	48.44
Education		
Illiteracy	7	5.47
Primary/Junior high school	82	64.06
High school	15	11.72
College	19	14.84
Tertiary and above	5	3.91
Ethnicity		
Kinh	115	89.84
Minority	13	10.16
Occupation		
Blue-collar worker	78	60.94
White-collar worker	9	7.03
Freelancer	10	7.81
Retirer	31	24.22
Marital status		
Married	97	75.78
Single	4	3.12
Divorced	1	0.78
Widowed	26	20.31
Living area		
Rural	78	60.94
Urban	36	28.12
Mountainous	14	10.94
Household economic status		
Lower	22	17.19
Higher	106	82.81
Support from family caregivers in providing care		
No	9	7.03
Yes	119	92.97
Impact of heart failure on occupation		
Still continuing the current occupation	26	20.31
Do not continue the current occupation	31	24.22
Can do it but less	71	55.47

As was shown in Figure 1, the most common traumatic stress factors were the sadness after a diagnosis of HF, which accounted for more than half of study sample (53.12%). The second most common stress factor then was documented with economic difficulties (20.31%).

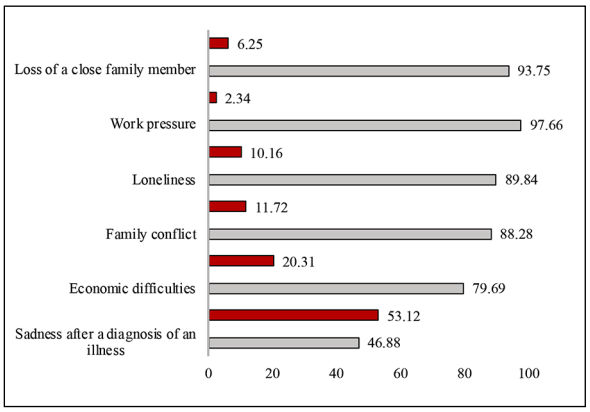

Figure 1. Stress factors among study patients with HF (N = 128). Calculated as the percentage; red = YES; gray = NO.

75.78%, and 7.03% respectively. Most of them received the support from family caregivers in providing care (92.97%). Regarding the impact of HF on the occupation, more than half of the patient sample can do current occupation but less (55.47%), 24.22% of them, reported to be unable to continue the current occupation and 20.31% of them were still continuing current occupation.

As was shown in Figure 1, the most common traumatic stress factors were the sadness after a diagnosis of HF, which accounted for more than half of study sample (53.12%). The second most common stress factor then was documented with economic difficulties (20.31%).

The overall prevalence of depression ICD-10 was 46.88% among the patients with HF. The proportion of depression fluctuated between 37.21% and 83.33% by NYHA classification. The highest percentage of depression was observed among NYHA class IV. In the univariate logistic regression analysis, compared to the prevalence of depression among patients with NYHA class II, the odds were 8.43 times higher for those with NYHA class IV (OR 8.43; 95% CI 1.63-43.46) (Table II).

There were statistically significant differences between non-depressed group and depressed group, observed in age ≥60 (p = 0.021), gender (p = 0.035), marital status (p = 0.001), family caregivers's support in providing care (p = 0.038), and HF impact on occupation (p <0.001) (Table III).

Patient's age was significantly associated with increased prevalence of depression (OR 1.07; 95% CI 1.003-1.14). It was significantly higher odds of depression in HF patients who felt sadness after a diagnosis of an illness (OR 18.02, 95% CI: 4.21-77.08). Individuals with higher household economic status were less likely to be diagnosed with depression compared to those with lower household economic status (OR 0.15, 95% CI: 0.02-0.92). The odds of depression were significantly higher in HF patients who reported with family conflict (OR 23.45, 95% CI: 1.29-423.55), and in those having the loss of a close family member (OR 38.62, 95% CI: 1.41-1055.98). Overall effect of multivariate logistic regression model was computed as McFadden's pseudo-R square, which was 50.40% (Table IV).

Discussion

Our study demonstrates that the onset of depression is a common occurrence in HF inpatients and five significant factors contributing to depression were identified to be age of HF patient, sadness after a diagnosis of an illness, higher household economic status, family conflict and loss of a close family member. Present results suggest a need for a disease management program addressing both psychological and HF aspects with the aim of improving health outcomes for the inpatients in Vietnam health facilities. These associated factors should be taken into account in planning hospitalization disease management programs as well as screening and intervention programs for the HF inpatients.

Table II. Prevalence of depression among HF patients according to NYHA heart failure classification.

	Overall Count (% of Total)	NYHA II Count (% of Total)	NYHA III Count (% of Total)	NYHA IV Count (% of Total)	*p*-value
Non-depression	68 (53.12)	27 (62.79)	39 (53.42)	2 (16.67)	0.018*
Depression	60 (46.88)	16 (37.21)	34 (46.58)	10 (83.33)	
OR (95% CI)		REF	1.47 (0.68-3.17)	8.43 (1.63-43.46)*	

*Significant at 0.05; Examined the difference by χ^2 test; REF: reference subgroup; OR: odd ratio; 95% CI: 95% confidence interval.

Table III. Difference of socioeconomic characteristics among non-depressed group and depressed group.

Selected variables	Depression		
	No (n = 68) Count (% of Total)	Yes (n = 60) Count (% of Total)	*p*-values
Age ≥ 60			0.021[C]*
No	34 (50.00)	18 (30.00)	
Yes	34 (50.00)	42 (70.00)	
Gender			0.035[C]*
Male	41 (60.29)	25 (41.67)	
Female	27 (39.71)	35 (58.33)	
Education			0.933[F]
Illiteracy	3 (4.41)	4 (6.67)	
Primary/Junior high school	44 (64.71)	38 (63.33)	
High school	8 (11.76)	7 (11.67)	
College	11 (16.18)	8 (13.33)	
Tertiary and above	2 (2.94)	3 (5.00)	
Ethnicity			0.956[C]*
Kinh	61 (89.71)	54 (90.00)	
Minority	7 (10.29)	6 (10.00)	
Occupation			0.178**
Blue-collar worker	47 (69.12)	31 (51.67)	
White-collar worker	5 (7.35)	4 (6.67)	
Freelancer	4 (5.88)	6 (10.00)	
Retirer	12 (17.65)	19 (31.67)	
Marital status			0.001[F]**
Married	58 (85.29)	39 (65.00)	
Single	3 (4.41)	1 (1.67)	
Divorced	1 (1.47)	0 (0.00)	
Widowed	6 (8.82)	20 (33.33)	
Living area			0.883[C]
Rural	42 (61.76)	36 (60.00)	
Urban	18 (26.47)	18 (30.00)	
Mountainous	8 (11.76)	6 (10.00)	
Household economic status			0.083[C]
Lower	8 (11.76)	14 (23.33)	
Higher	60 (88.24)	46 (76.67)	
Support from family caregivers in providing care			0.038[F]*
No	7 (10.29)	2 (3.33)	
Yes	61 (89.71)	58 (96.67)	
Impact of heart failure on occupation			< 0.001[C]***
Still continuing the current occupation	21 (30.88)	5 (8.33)	
Do not continue the current occupation	7 (10.29)	24 (40.00)	
Can do it but less	40 (58.82)	31 (51.67)	

F: Fisher's exact test; C: χ^2 test; *, **, ***Significant at 0.05, 0.01, and 0.001, respectively.

Depressive symptoms have been linked to the development and progression of HF and other cardiovascular diseases. Also, depression is known as a poor prognostic marker in patients with a diagnosis of HF. In the present study, we found depression developed in 46.88% of HF patients in our institution, which was in line with the studies of inpatients and outpatients when this figure ranged from 9 to 60% in a previous report[10] and was estimated to be higher two-to-three times higher than the general population[11]. High prevalence of depression in our study was noted because this phenomenon is, to date, often less measured and missed in clinical practice conditions in Vietnam health facilities. A point need to be highlighted here: most studies documented the depressive patients by means of using the instruments of PHQ and/or BDI, when we documented the patients with depression through a definitive diagnosis according to ICD-10 depression diagnostic criteria. This point was also consistent with available evidence[12], indeed, our analysis indicated HF patients having a diagnosis of depression with range from 37.21% in NYHA classes

Table IV. Factors associated with depression: the multivariable regression model.

Selected variables	OR	SE	*p*-values	95% CI	
				Lower	Upper
Age	1.07	0.03	0.039*	1.003	1.14
Gender					
Male	REF				
Female	3.66	2.62	0.069	0.90	14.92
Education					
Illiteracy	REF				
Primary/Junior high school	0.47	0.65	0.591	0.03	7.28
High school	1.69	3.21	0.779	0.04	69.51
College	0.53	0.98	0.736	0.01	19.50
Tertiary and above	2.63	5.71	0.655	0.03	184.31
Ethnicity					
Kinh	REF				
Minority	1.95	2.36	0.579	0.18	20.88
Occupation					
Blue-collar worker	REF				
White-collar worker	0.67	0.91	0.773	0.04	9.40
Freelancer	6.34	8.56	0.171	0.44	89.39
Retirer	0.84	0.93	0.877	0.09	7.32
Marital status					
Married	REF				
Single	0.69	1.26	0.84	0.01	24.97
Divorced	N/A				
Widowed	2.41	2.40	0.378	0.34	17.05
Living area					
Rural	REF				
Urban	1.60	1.62	0.638	0.22	11.61
Mountainous	1.53	1.76	0.71	0.16	14.65
Household economic status					
Lower	REF				
Higher	0.15	0.13	0.041*	0.02	0.92
Support from family caregivers in providing care					
No	REF				
Yes	2.65	3.96	0.514	0.14	49.70
Impact of heart failure on occupation					
Still continuing the current occupation	REF				
Do not continue the current occupation	1.05	1.23	0.96	0.10	10.36
Can do it but less	2.11	2.01	0.432	0.32	13.64
Sadness after a diagnosis of an illness					
No	REF				
Yes	18.02	13.36	<0.001**	4.21	77.08
Economic difficulties					
No	REF				
Yes	1.03	0.77	0.963	0.23	4.49
Family conflict					
No	REF				
Yes	23.45	34.62	0.033*	1.29	423.55
Loneliness					
No	REF				
Yes	1.06	1.46	0.966	0.07	15.87
Work pressure					
No	REF				
Yes	40.82	79.80	0.058	0.88	1883.25
The loss of a close family member					
No	REF				
Yes	38.62	65.19	0.03*	1.41	1055.98
Pseudo R2	0.5040				

REF: reference subgroup; OR: odd ratio; SE: standard error; 95% CI: 95% confidence interval; *, **Significant at 0.05 and 0.001, respectively.

II and 83.33% in NYHA class IV, along with the increasing prevalence by NYHA functional class. Notably, the univariate logistic regression model indicated that NYHA class IV increased the odds of in-hospital depression by 8.43-fold; while recent systematic review of Mandana Moradi et al[3] showed that odds of depression with any severity in HF patients was significantly 2.5 times higher with NYHA class III, IV compared to with NYHA class I, II.

Older age was documented as one of contributing factors for depression in various patient populations[13,14] and especially this problem was prevalent in older adults[15]. This point was reasonable when older adults were common in our sample size of HF patients. In the Vietnamese study population with HF, we saw that older age was significantly associated with greater prevalence of depression. It is consistent with previous studies[16,17]. According to the best review of the research team, not many studies have analyzed the association between patient age and depression with quantitative variable of age without dividing the cut-off value, such as 60 years old, 65 years old or 70 years old.

A low socioeconomic status has been directly related to more frequent mental health problems and poorer cardiovascular disease outcomes[18-21]. In particular, depression leads to poor outcomes, including increased risk of poor functional status, hospital readmission and mortality for HF patients, and long-term caring burden on family caregivers, consequentially, contributing to the higher healthcare costs imposed on the family and the health system[1,5]. Our evidence supported that HF patients with higher household economic status were at lower risk of depression compared to those with lower household economic status.

Stressful life events, such as the loss of a close family member, have been proved to be one of the most stressful life-events increasing the risk of affective disorders, of which, depressive symptoms[22,23]. One of the most important findings from this study was that patients experiencing loss of a close family member added significant burden and greater depressive prevalence to HF patients. It may be reasonable that these stress factors have been linked to a burden for family caregivers, while caring for HF patient is a considerable burden for family caregivers[24,25]. Besides, the most striking result of our study was that patients who reported with family conflict were significantly more depressive compared to those without family conflict.

Despite providing meaningful findings in HF inpatients under a real study picture in Vietnam's clinical practice, several limitations need be considered in the interpretation. In this study context, we only considered socio-demographic factors and common stress factors that increased the vulnerability to the presence of depression. Besides the limitation of constructed causal relationships, generalizations of present inference to other contexts should also be noted because the study sample may only be representative of the actual HF inpatient population in our institution. We suggest further studies on a larger sample size with a broad variety of clinical and laboratory potential risk factors as well as lifestyle habits and treatment situation.

Conclusions

The current results for the first time provide preliminary support for a potential role of socio-demographic factors and common stress factors for the presence of depression in HF inpatients. With relatively high prevalence of depression, the study also indicated that patient age, sadness after a diagnosis of an illness, household economic status, family conflict and loss of a close family member were significantly independently associated with depression in the inpatients with a diagnosis of HF. A collaboration on a routine basis between cardiologists and psychiatrists is needed to explore the prevalence and severe of depression in HF patients. A small difference in identifing symptoms of depression may be sufficient to considerably influence the course of a chronic long-term condition as HF.

Authorship Contribution Statement

Nguyen-Ngoc Tran, Van-San Bui, and Van-Hai Nguyen contributed to the conception of this work and the design of the study. Thi-Phuong-Nam Hoang, Van-Hai Nguyen and Hoang-Long Vo acquired data. Nguyen-Ngoc Tran and Hoang-Long Vo performed the statistical analyses. Nguyen-Ngoc Tran, Van-San Bui, Van-Hai Nguyen, and Hoang-Long Vo conducted the interpretation of the data and drafted the manuscript. Hoang-Thanh Nguyen and Minh-Tam Duong revised the work critically for important intellectual content. All authors have approved the submitted version of the manuscript.

Conflict of Interest
The Authors declare that they have no conflict of interests.

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Availability of Data and Materials
The data presented in this study are available upon request from the corresponding author. Due to the protection of personal data, the data are not publicly available.

Authors' Contribution
Nguyen-Ngoc Tran, Van-San Bui, and Van-Hai Nguyen contributed to the conception of this work and the design of the study. Thi-Phuong-Nam Hoang, Van-Hai Nguyen and Hoang-Long Vo acquired data. Nguyen-Ngoc Tran and Hoang-Long Vo performed the statistical analyses. Nguyen-Ngoc Tran, Van-San Bui, Van-Hai Nguyen, and Hoang-Long Vo conducted the interpretation of the data and drafted the manuscript. Hoang-Thanh Nguyen and Minh-Tam Duong revised the work critically for important intellectual content. All authors have approved the submitted version of the manuscript.

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