








## ORIGINAL ARTICLE

## Prevalence and factors associated with anxiety and depressive symptoms in patients with heart failure

### HIGHLIGHTS

1. Symptoms of anxiety and depression were prevalent in patients with heart failure.
2. Anxiety is associated with sex, marital status, and education level.
3. Functional class correlated with depressive symptoms in the participants.

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### ABSTRACT

**Objective:** To identify the prevalence and sociodemographic and clinical factors associated with anxiety and depressive symptoms in patients with heart failure at a cardiology outpatient clinic. **Methods:** A cross-sectional study was conducted at a cardiology outpatient clinic in João Pessoa, Paraíba, Brazil, involving 88 patients. Anxiety and depressive symptoms were assessed using the Hospital Anxiety and Depression Scale. Association tests, Spearman's correlation and Poisson regression were conducted. **Results:** The prevalence of anxiety symptoms was 67.1%, and the prevalence of depressive symptoms was 34.1%. Marital status, sex, and education level were significantly associated with anxiety symptoms. **Conclusions:** A high prevalence of anxiety and depression symptoms was identified. Health interventions are necessary to minimize the impact of psychological symptoms, as such measures are essential to improve adherence to therapy and the quality of life of patients with heart failure.

**DESCRIPTORS:** Heart Failure; Cardiovascular Diseases; Anxiety; Depression; Prevalence.

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## INTRODUCTION

Heart failure (HF) is a chronic clinical syndrome characterized by the inability of the heart to provide adequate perfusion to the organs. It is associated with structural or functional changes that have adverse effects on the body, leading to reduced quality of life, increased hospital admissions, and higher mortality rates<sup>1-2</sup>.

Globally, HF affects between 1% and 3% of the adult population, particularly the elderly population. It is estimated that over 64 million people worldwide live with HF<sup>2</sup>. In Brazil, during the 2022-2023 period, 408,771 hospital admissions due to HF were recorded<sup>3</sup>.

Evidence highlights that anxiety and depression are prevalent in HF patients and have been associated with syndrome progression and adverse clinical outcomes<sup>4-5</sup>. A systematic review indicated that the global prevalence of depression in HF patients ranges from 20% to 45%, while the prevalence of anxiety ranges from 20% to 50%<sup>1</sup>. These disorders cause exacerbated neurohormonal changes, mood dysregulation, and impairments in cognitive function, which influence negative thought patterns and compromise the individual's ability to perform self-care behaviors essential for maintaining functional capacity and quality of life<sup>4-5</sup>.

A multicenter investigation conducted in 71 hospital centers in Brazil, with 3,013 participants, revealed that 13.2% of the patients had a diagnosis of depression<sup>6</sup>. Previous research points to factors such as female gender, marital status, advanced age, hospital readmissions, and pre-existing comorbidities as being associated with depressive symptoms<sup>7-8</sup>.

International guidelines recommend that health professionals perform screening for anxiety and depressive symptoms in patients with HF<sup>9-10</sup>. This research is relevant to clinical practice, as the assessment of these psychological symptoms can inform nurses and multidisciplinary team professionals in developing care plans. Additionally, it supports the implementation of non-pharmacological health interventions aimed at symptom management, thereby enhancing treatment adherence, facilitating decision-making, and improving patient well-being.

Thus, the objective of this study was to identify the prevalence and sociodemographic and clinical factors associated with anxiety and depressive symptoms in patients with HF at a cardiology outpatient clinic.

## METHOD

This is a cross-sectional, analytical, and exploratory study conducted according to the recommendations of the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE). The research was carried out at the cardiology outpatient clinic of a medium- and high-complexity hospital affiliated with the Federal University of Paraíba, managed by the Brazilian Company of Hospital Services (EBSERH), located in João Pessoa, PB, Brazil. In this outpatient clinic, patients are referred through the municipal regulatory system for specialized cardiology consultations.

The study population consisted of 112 patients with HF under follow-up at the service. The sample size calculation was performed using the publicly available OpenEpi program,

version 3.01, based on a previous study<sup>5</sup> that identified a 62% prevalence of anxiety symptoms in HF patients, with a 95% confidence level and a 5% sampling error. The calculation resulted in a minimum sample size of 86 participants.

The inclusion criteria were: patients with a diagnosis of HF, aged  $\geq 18$  years, regardless of etiology, and Left Ventricular Ejection Fraction (LVEF) contained in the transthoracic echocardiogram report. The exclusion criteria were: patients with a medical diagnosis of anxiety or depression, cognitive impairment, and the use of psychotropic medications (anxiolytics and antidepressants) recorded in the medical records.

Data were collected from patients who were prescheduled for consultations by verifying the inclusion and exclusion criteria in the clinical records between September 2022 and April 2023 using convenience sampling. Each participant underwent an individual interview in a private environment that lasted for approximately 40 minutes. Data were collected using two instruments:

1) A form for the sociodemographic and clinical characterization of HF patients, used in a previous study<sup>11</sup>, containing the following variables: date of birth, age, gender, origin, self-declared race, partner (with partner; without partner), education level, employment situation, family income, etiology of HF, functional class according to the New York Heart Association (NYHA) criteria, comorbidities, LVEF recorded in a transthoracic echocardiogram report, and current medication use.

2) The Hospital Anxiety and Depression Scale (HADS), translated and validated for Brazilian Portuguese<sup>12</sup>, was used to assess anxiety and depressive symptoms. The HADS consists of two subscales with 14 items (seven for anxiety and seven for depression), with multiple-choice response options. Each item is scored on a scale from zero to three, with a maximum score of 21 for each subscale. Higher scores indicate greater symptom perception<sup>12</sup>. Scores from 0 to 7 indicate the absence of symptoms, scores between 8 and 10 indicate moderate symptoms, and scores  $\geq 11$  correspond to significant levels of anxiety or depression<sup>7</sup>.

The data were organized in Microsoft Office Excel spreadsheets and analyzed using the Statistical Package for the Social Sciences (SPSS) version 22.0 for Windows (IBM Corp., Armonk, NY, USA). Descriptive statistics were performed (absolute and relative frequencies, mean, standard deviation, median, and interquartile range).

The normality of the data was assessed using the Kolmogorov-Smirnov test, which indicated a non-normal distribution. To identify the association between sociodemographic, clinical variables, and anxiety and depression scores, the chi-square test or Fisher's exact test was used.

For the analyses, the sociodemographic variables were grouped into subgroups: age ( $< 59$ ;  $\geq 60$ ), gender (male; female), skin color (white; non-white), education level ( $< 8$  years;  $\geq 8$  years), partner (with partner; without partner), employment situation (economically active; inactive), family income (up to one salary; more than one salary). As for clinical variables: etiology (ischemic; non-ischemic), NYHA functional class (NYHA I, NYHA II, NYHA III), LVEF (reduced; preserved), number of comorbidities (1-2 comorbidities;  $\geq 3$  comorbidities), number of medications (1-5 medications;  $\geq 6$  medications). Anxiety and depression symptoms were categorized as no symptoms (0 to 7 points) and with symptoms ( $\geq 8$  points).

Spearman's correlation analysis was conducted to measure the relationships between the total HADS score and sociodemographic and clinical variables. To assess the strength of the correlations, the following criteria were adopted:  $\leq 0.30$  for weak

magnitude, between 0.40 and 0.60 for moderate magnitude, and above 0.70 for strong magnitude<sup>13</sup>.

The variables with a p-value  $\leq 0.20$  obtained in the inferential analysis were tested in the multivariate model using Poisson regression with robust variance, and the variables with statistical significance at 5% remained in the final model. These decisions were made following recommendations from the literature<sup>14</sup>. Several models were adjusted, considering the Akaike Information Criterion (AIC) and the Omnibus Test. The final model included all variables with a p-value  $< 0.05$ .

Participants formalized their agreement with the study by signing the Informed Consent Form (ICF). The research was approved by the Research Ethics Committee, under approval number 5.470.220/2022. All ethical and legal principles of Resolution No. 466/2012 of the National Health Council were followed.

## RESULTS

A total of 88 patients with HF participated in the study, 56.8% (n=50) of whom were residents of João Pessoa, PB, and 43.2% (n=38) were from the metropolitan area, with a mean age of  $57.16 \pm 13.20$  years, ranging from 24 to 82 years. Of these, 52.3% (n=46) were male, 47.7% (n=42) self-identified as mixed race, 50% (n=44) were married or in stable unions, 50% (n=44) were retired, and 65.9% (n=58) had a family income of one minimum wage.

Regarding clinical variables, 70.5% (n=62) had non-ischemic etiology, 42% (n=37) were classified as functional class II according to the NYHA, with a mean left ventricular ejection fraction (LVEF) of  $40.40 \pm 13.86\%$ , 31.8% had hypertension associated with HF, 78.1% did not engage in physical activity, and 35.1% were using beta-blockers.

The median anxiety symptom score was 9.00 (interquartile range 9.00 to 11.75), ranging from 4 to 18 points, while the median depression score was 6.00 (interquartile range 6.00 to 8.00), ranging from 0 to 14 points, respectively. The prevalence of anxiety symptoms was 67.1%, and the prevalence of depression symptoms was 34.1%.

Table 1 shows the association between anxiety and depressive symptoms and sociodemographic variables. Sex and marital status were significantly associated with anxiety symptoms. No variables associated with depression were identified.

Table 2 presents the association between anxiety and depressive symptoms and the clinical variables. No association was found between the variables and anxiety symptoms. A significant association was found between the NYHA functional class and depressive symptoms.

Table 3 displays the correlation values between the variables of the sample studied. A weak, significant negative correlation was identified between education level and HADS anxiety score ( $\rho = -0.249$ ), meaning that lower education levels were associated with higher perception of anxiety symptoms. Regarding NYHA functional class, a weak, significant positive correlation was found with HADS depression score ( $\rho = 0.265$ ), indicating that higher functional class according to the NYHA scale was associated with more depressive symptoms.

**Table 1.** Sociodemographic factors associated with anxiety and depressive symptoms in patients with HF. João Pessoa, PB, Brazil, 2023

Variables	N (%)	HADS Anxiety		p-value	HADS Depression		p-value
		No symptoms	With symptoms		No symptoms	With symptoms	
<b>Age</b>				0.599*			0.759*
≤ 59 years old	46 (52.3)	14 (15.9)	32 (36.4)		31 (35.2)	15 (17.0)	
≥ 60 years	42 (47.7)	15 (17.0)	27 (30.7)		27 (30.7)	15 (17.0)	
<b>Sex</b>				0.002*			0.097*
Male	46 (52.3)	22 (25.0)	24 (27.3)		34 (38.6)	12 (13.6)	
Female	42 (47.7)	7 (8.0)	35 (39.8)		24 (27.3)	18 (20.5)	
<b>Skin color</b>				0.819*			0.111*
White	17 (19.3)	6 (6.8)	11 (12.5)		14 (15.9)	3 (3.4)	
Non white	71 (80.7)	23 (26.1)	48 (54.5)		44 (50.0)	27 (30.7)	
<b>Education</b>				0.111*			0.353*
< 8 years of study	50 (56.8)	13 (14.8)	37 (42.0)		35 (39.8)	15 (17.0)	
> 8 years of study	38 (43.2)	16 (18.2)	22 (25.0)		23 (26.1)	15 (17.0)	
<b>Partner</b>				0.041*			1.000*
With partner	44 (50.0)	10 (11.4)	34 (38.6)		29 (33.0)	15 (17.0)	
Without partner	44 (50.0)	19 (21.6)	25 (28.4)		29 (33.0)	15 (17.0)	
<b>Employment situation</b>				0.263**			0.319*
Economically active	8 (9.1)	1 (1.1)	7 (8.0)		4 (4.5)	4 (4.5)	
Inactive	80 (90.9)	28 (31.8)	52 (59.1)		54 (61.4)	26 (29.5)	
<b>Income</b>				0.136*			0.291*
Up to one minimum wage	58 (65.9)	16 (18.2)	42 (47.7)		36 (40.9)	22 (25.0)	
More than one minimum wage	30 (34.1)	13 (14.8)	17 (19.3)		22 (25.0)	8 (9.1)	

Legend: Minimum wage of R\$ 1,212.00. p < 0.05. \*Chi-square test; \*\*Fisher's test.

Source: The authors (2023).

**Table 2.** Clinical factors associated with anxiety and depressive symptoms in patients with HF. João Pessoa, PB, Brazil, 2023

(continue)

Variables	N (%)	HADS Anxiety		p-value	HADS Depression		p-value
		No symptoms	With symptoms		No symptoms	With symptoms	
<b>Etiology</b>				0.830*			0.946*
Ischemic	26 (29.5)	9 (10.2)	17 (19.3)		17 (19.3)	9 (10.2)	
Non-ischemic	62 (70.5)	20 (22.7)	42 (47.7)		41 (46.6)	21 (23.9)	
<b>NYHA</b>				0.431*			0.029*
NYHA I	21 (23.9)	6 (6.8)	15 (17.0)		18 (20.5)	3 (3.4)	
NYHA II	37 (42.0)	15 (17.0)	22 (25.0)		25 (28.4)	12 (13.6)	
NYHA III	30 (34.1)	8 (9.1)	22 (25.0)		15 (17.0)	15 (17.0)	
<b>Ejection Fraction</b>				0.531**			0.679*
Reduced LVEF	66 (82.5)	23 (28.8)	43 (53.8)		43 (48.9)	21 (23.9)	
Preserved LVEF	14 (17.5)	3 (3.8)	11 (13.8)		15 (17.0)	9 (10.2)	



**Table 2.** Clinical factors associated with anxiety and depressive symptoms in patients with HF. João Pessoa, PB, Brazil, 2023

(conclusion)

Variables	N (%)	HADS Anxiety		p-value	HADS Depression		p-value
		No symptoms	With symptoms		No symptoms	With symptoms	
Number of comorbidities				0.709*			0.709*
1-2 comorbidities	40 (45.5)	14 (15.9)	26 (29.5)		14 (15.9)	26 (29.5)	
3 or more comorbidities	48 (54.5)	15 (17.0)	33 (37.5)		15 (17.0)	33 (37.5)	
Number of medications				0.240*			0.975*
1 - 5 medications	35 (39.8)	9 (10.2)	26 (29.5)		23 (26.1)	12 (13.6)	
> 6 medications	53 (60.2)	20 (22.7)	33 (37.5)		35 (39.8)	18 (20.5)	

Legend: p &lt; 0.05. \*Chi-square test; \*\*Fisher's test.

Source: The authors (2023).

**Table 3.** Correlation between sociodemographic, clinical and HADS variables. João Pessoa, PB, Brazil, 2023

Variables	HADS Anxiety	p-value	HADS Depression	p-value
Age	-0.122	0.256	-0.058	0.589
Education	-0.249	0.019*	0.114	0.289
Number of comorbidities	0.071	0.510	0.076	0.483
LVEF	0.027	0.811	0.048	0.671
Number of Medications	-0.167	0.120	-0.09	0.931
NYHA functional class	0.175	0.103	0.265	0.013*

Legend: \*p &lt; 0.05. LVEF: Left ventricular ejection fraction.

Source: The authors (2023).

In Table 4, following the multiple Poisson regression analysis, the variables that remained associated with anxiety levels were sex, marital status, and education level. The prevalence of anxiety symptoms was 76% higher in women and 67% higher in individuals living with a partner. Each additional year of education was associated with a 4% reduction in the prevalence of anxiety symptoms. In this model, no statistically significant variables were found associated with depressive symptoms.

**Table 4.** Poisson Regression Model associated with the presence of anxiety symptoms. João Pessoa, PB, Brazil, 2023

Variables	PR <sup>†</sup>	95% CI <sup>‡</sup>	p-value
Sex			<0.001 <sup>§</sup>
Female	1.76	1.31-2.35	
Male	1	-	
Marital status			<0.001 <sup>§</sup>
With partner	1.67	1.26-2.21	
Without partner	1	-	
Education	0.96	0.934-0.995	0.025 <sup>§</sup>

Legend: <sup>†</sup>PR: Adjusted Prevalence Ratio; <sup>‡</sup>95% CI: 95% Confidence Interval; <sup>§</sup>p-value of the multivariate analysis model (Poisson regression with robust variance).

Source: The authors (2023).

## DISCUSSION

This study identified the prevalence and sociodemographic and clinical factors associated with anxiety and depressive symptoms in HF patients at a cardiology outpatient clinic. A prevalence of 67.1% for anxiety and 34.1% for depressive symptoms was observed. These findings underscore the importance of screening for psychological symptoms during therapeutic management. A similar finding was reported in a systematic review, which indicated that the prevalence of depression in HF patients ranged from 20% to 45%<sup>1</sup>. The presence of anxiety and depressive symptoms leads to poorer prognosis, increased use of healthcare services, hospital readmissions, and adverse clinical outcomes in HF<sup>15</sup>.

Regarding anxiety and depression symptoms, the HADS scores observed in this study were similar for anxiety and lower for depression than those in a study conducted in Jordan<sup>5</sup>. Another study involving 127 participants reported higher scores for anxiety and depression symptoms<sup>16</sup>.

The prevalence of symptoms this study was lower than that observed in a Japanese study, which showed that 31% of participants had mild anxiety symptoms, and 16% had severe anxiety symptoms. Regarding depressive symptoms, 52% had mild symptoms, while 28% had severe symptoms<sup>17</sup>. Another study conducted in Saudi Arabia, sample of 205 participants, found a prevalence of 56.9% for anxiety and 52.7% for depressive symptoms<sup>8</sup>, further corroborating the high prevalence of disturbances in this population.

Concerning sociodemographic variables, sex and marital status were associated with anxiety symptoms. This result aligns with studies showing a significant difference in anxiety symptoms between men and women<sup>18</sup>. A review found that women are approximately three times more likely to report anxiety symptoms compared to men<sup>19</sup>. However, further investigations are needed to clarify these differences.

The findings of this study related to marital status diverged from the literature, which shows that married patients tend to have better coping mechanisms for heart disease<sup>20</sup>. Other authors emphasized that married individuals with family support exhibited better heart management behaviors and improvements in anxiety and depression symptoms<sup>21</sup>.

One possible explanation for the results in this study is that data collection occurred after the pandemic, which was marked by the effects of social isolation and the challenges families faced in managing and supporting health issues, especially during interruptions in follow-up care. Therefore, future studies should explore the impact of anxiety and depressive symptoms in different family arrangements.

This study identified an association between education level and anxiety symptoms. The results were like those found in a study conducted in Iran, in which health literacy reduced the likelihood of a cardiac event by 69%<sup>22</sup>. Research on patients with post-pandemic cardiovascular diseases found that anxiety and depression were more prevalent in participants with a low level of education<sup>23</sup>. Low health literacy is associated with suboptimal practices that promote the development of heart disease. This is due to increased exposure to risk factors such as smoking, poor diet, lack of physical activity, and low adherence to therapeutic follow-up, all of which contribute to a worse prognosis<sup>24</sup>.

In this sample, no significant correlations were found between education level and depression. However, a Chinese study identified that health literacy had an important impact on the relationship between depression and self-care behaviors. The presence

of depression reduces motivation and actions related to personal care, contributing to a limited understanding of one's health condition, which results in lower confidence and less effective self-care practices<sup>25</sup>.

Regarding clinical variables, NYHA classes II and III were the most prevalent, indicating that the patients in this study presented mild symptoms triggered by exertion or severe limitations in physical activity. The correlation analysis indicated that the higher the functional class, the greater the presence of depressive symptoms. This finding is supported by studies that emphasize the prevalence of depression in relation to the severity of HF and non-adherence to treatment<sup>5,16,21</sup>. Patients diagnosed with HF in stages III and IV had a higher prevalence of depression compared to those in stages I and II<sup>5</sup>, as those in advanced stages experience increased hospitalization needs and higher mortality risks<sup>10</sup>. These findings may support non-pharmacological therapeutic strategies, such as health education programs using accessible language and audiovisual technologies and therapeutic groups offering emotional support. Such measures are essential for reducing the emotional impact of HF, promoting clinical stability, improving disease coping, and enhancing the quality of life.

One limitation of this study is its cross-sectional design, which precludes the establishment of a causal relationship. Additionally, the study was conducted at a single institution in a specific region of Northeast Brazil, thereby limiting the generalizability of the findings and necessitating caution when applying them to other contexts. Future research should include cohort studies with larger sample sizes. It is also recommended that new predictive models be tested to evaluate the impact of emotional symptoms on the clinical outcomes of HF.

## CONCLUSIONS

A high prevalence of anxiety and depressive symptoms was identified in patients with HF. In the regression model, sex, marital status, and education level were significantly associated with anxiety symptoms. A weak positive correlation was observed between the NYHA functional class and depressive symptoms. Therefore, it is essential for nurses and other members of the multidisciplinary team to screen for psychological symptoms and develop strategies that assist in the clinical management of symptom burden, to reduce adverse clinical outcomes.

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Substantial contributions to the conception or design of the work; or the acquisition, analysis, or interpretation of data for the work - **de Lima DFS, de Souza JP, de Andrade LL, Leadebal ODCP, Freire MEM, Fredericks S, de Sousa MM**. Drafting the work or revising it critically for important intellectual content - **de Lima DFS, de Souza JP, de Andrade LL, Leadebal ODCP, Freire MEM, Fredericks S, de Sousa MM**. Agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved - **de Lima DFS, de Souza JP, de Sousa MM**. All authors approved the final version of the text.

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The authors have no conflicts of interest to declare.

**Data availability:**

The authors declare that the data can be made available upon request to the corresponding author.

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