



Depression and Anxiety in Heart Failure Patients in a South Indian Population: A Pilot Study

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Abstract:

Aim: To evaluate prevalence of depression and anxiety disorders in patients with heart failure in Indian population and analyse their possible predictors and risk factors.

Methods and Material: Patients with heart failure hospitalized in tertiary care centre between January 2011 to July 2011 were included in the study. Patients were given self-administered questionnaires viz. Zung Self-Rating Depression Scale and Zung Self-Rating Anxiety scale for depression and anxiety assessment during hospitalization. Demographic data and physical history of patients were collected.

Statistical analysis: Data obtained were assessed using one-way analysis of variance or Student's t-test wherever appropriate.

Results: Of a total of 82 patients, 63 returned the questionnaires. Mean age of participants was 61 years. Mean depression and anxiety scores were 56.9 ± 1.48 and 54.5 ± 1.59 respectively. Depression was common in patients with class II and III heart failure, patients with multiple comorbid conditions and those with previous history of stroke or MI ($p < 0.05$). Depression was found to be significant in patients who were on adjuvant beta blockers and statins ($p < 0.05$) compared to patients on other medications. The main predictors of anxiety were presence of comorbidities and severity of disease.

Conclusion: NYHA class II and III, advancing age, presence of comorbidities and previous history of MI showed a strong positive association with depression and anxiety scores. Patients on beta blockers and statins were reported to have higher levels of depression. Early diagnosis of mood disorders may aid in long-term management and better quality of life in heart failure patients.

Keywords: depression, anxiety, heart failure, comorbidities, self-administered questionnaires.

1. INTRODUCTION

Chronic heart failure, often known as congestive heart failure (CHF), affects approximately 5 million Americans with 550,000 new cases being diagnosed each year.¹ It is a complex syndrome that is associated with profound disease morbidity and mortality and has an adverse impact on the quality of life.² Patients with heart failure (HF) have 6-9 times higher mortality rates over a five year period compared to those without the disease.³ Recent

studies have shown that HF patients often have higher rates of depression compared to the general population. The prevalence of major depression in HF patients is reported to be about 15-22%.^{4, 5} Depression is an independent risk factor for poor prognosis in HF patients, and has been significantly associated with higher readmission rates, prolonged hospitalization and reduced functional status.^{5, 6} Few studies have reported that

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anxiety disorders also occur in HF patients with a prevalence rate of 18-45%.^{7, 8} Anxiety is often present concurrently with depression and may reflect one of its manifestations. Persistent anxiety is predictive of disability, increase in physical signs and symptoms, and worse functional status. Anxiety has been adversely associated with increased risks of myocardial infarction and fatal ischemic heart disease (IHD),⁹⁻¹¹ and worsens quality of life in patients with cardiovascular diseases.

Reliable data on the prevalence of HF in Indian population is lacking. Based on disease-specific estimates, the prevalence of heart failure in India due to coronary artery disease, hypertension, diabetes, obesity and rheumatic heart disease ranges from 1.3 to 4.6 million, with 491,600-1.8 million occurring annually.¹²

While the role of depression in the etiology and prognosis of heart failure has been established in many studies, the evidence for the role of anxiety is less clear. Prevalence of depression or anxiety in HF patients among the Indian population has been under-researched and remains largely unknown. This study was therefore conducted to evaluate the prevalence and severity of depression and anxiety in a sample of in-patients with HF using simple, self-administered questionnaires.

2. MATERIALS AND METHODS:

2.1. Subjects:

The study was conducted in a tertiary care multidisciplinary teaching hospital providing both inpatient and outpatient healthcare services. The hospital ethics committee approved this study (IEC 77/2011) and a written informed consent form was obtained from the participants. Adult patients (>18 years of age) who were admitted to the cardiology unit between January 2011 and July 2011 were eligible for the study. Patients were included if they had a clinical diagnosis of HF, defined as New York Heart Association (NYHA) class \geq II, an ejection fraction of \leq 35% (determined by echocardiography, or angiography), or both. Patients were excluded for pregnancy, active suicidal tendency, planned major surgery, and who could not provide an informed consent.

2.2. Assessments:

All participants were requested to complete two sets of questionnaires, Zung Self-Rating Depression Scale and Zung-Self Rating Anxiety Scale, which are self-administered, 20-item questionnaires for measuring depression and anxiety, respectively. The questionnaires were previously validated by three clinicians of cardiology department and ten patients who had a clinical diagnosis of heart failure.

The Zung-Self Rating Depression Scale¹³ is an established tool for screening depression in various populations, and is sensitive to changes in mood. There are 20 items on the

scale that rate the four common characteristics of depression, the persuasive effect, the physiological equivalents, other disturbances, and psychomotor activities. The severity of depression is assessed based on the total score which can range between 20-80, with scores <50 indicating no clinical depression, scores of 50-59 indicating minimal to mild depression, scores of 60-69 indicating moderate to marked depression, and scores of \geq 70 indicating presence of severe to extreme depression. The Zung self-rating anxiety scale,¹⁴ similar to the depression scale, is a 20-item self-administered questionnaire to evaluate patients for anxiety-associated symptoms. Scores of 25-44 indicate normal levels of anxiety, scores of 45-59 indicate mild to moderate levels of anxiety, scores of 60-74 indicate marked to severe anxiety levels and scores \geq 75 indicate extreme levels of anxiety.

2.3 Data collection:

Detailed demographic data were collected from patients' medical records or personal interviews, including age, sex, marital status, social support, primary reason for admission, vital signs, comorbid conditions, NYHA class, left ventricular ejection fraction, and prescribed medications.

2.4 Statistical analysis:

Summary statistics (expressed as percentages and mean \pm SD) were used to describe demographic and clinical characteristics of the study population. Bivariate associations of demographic and clinical variables between each of depression and anxiety scores were assessed separately using one-way analysis of variance or Student's t-test wherever appropriate. All analyses were performed with SAS software (version 16.0, SAS). Values of $p < 0.05$ were considered to be statistically significant.

3. RESULTS:

Of a total sample of 82 CHF patients, 63 (39 male and 24 female) completed both the sets of questionnaires. The mean age of participants was 61 years (standard deviation: S.D. =11).

Table 1 summarises the medical characteristics of the sample.

Patients with heart failure were on multiple medications including angiotensin converting enzyme inhibitors, nitrates, diuretics, beta blockers, statins, hypnotics and drugs for respiratory problem. **Table 2** shows the percentage of patients on various medications.

3.2. Depression and anxiety scores:

Graph 1 represents the percentage of patients with different levels of depression based on Zung Self-Rating Depression Scale. The mean depression score was 56.9 ± 1.48 . Graph 2 represents the percentage of patients with

different levels of anxiety based on Zung Self-Rating Anxiety Scale. Mean anxiety score was 54.5 ± 1.59 .

3.3. Predictors of depression and anxiety scores:

Anxiety and depression scores were individually analysed and correlated with demographic variables and physical status of the patient.

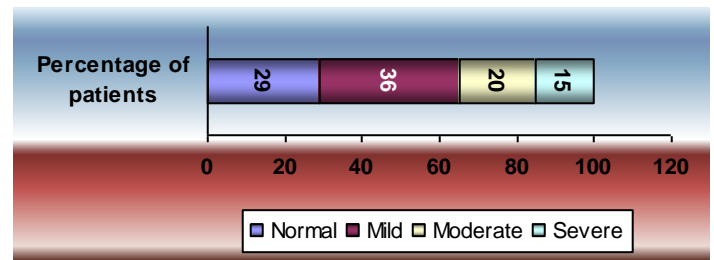
Table 3 shows the bivariate analysis of the various factors associated with depression and anxiety measures. Bivariate associations of demographic and clinical variables between each of depression and anxiety scores were assessed separately using one-way analysis of variance or Student’s t-test wherever appropriate. Values of $p < 0.05$ were considered to be statistically significant.

Variables	Mean \pm SD / Frequency (%)
Age	61 \pm 11
Sex	62 (males) ; 38 (females)
NYHA class	
• Class II	46
• Class III	24
• Class IV	8
Cause of CHF	
• IHD	68
• Valvular	8
• Hypertension	4
Co-morbid conditions	
• Hypertension	44
• Diabetes	30
• Angina	46
• Respiratory illness	14
Previous history of illness	
• MI	56
• Stroke	12

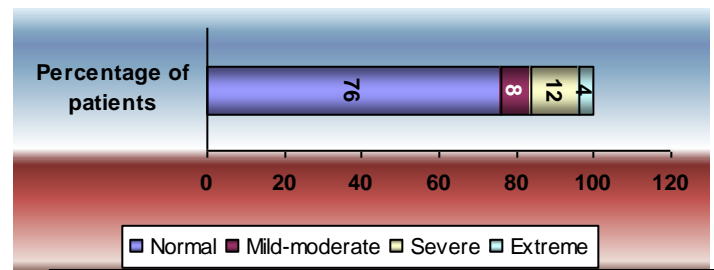
Table 1: Medical characteristics of the sample population (n=63)

Prescribed medications	Frequency (%)
Angiotensin converting enzyme inhibitors	84
Nitrates	60
Diuretics	88
Beta blockers	44
Statins	78
Hypnotics	36
Others	52

Table 2: Medications taken by heart failure patients



Graph 1: Percentage of patients with different levels of depression based on Zung Self-Rating Depression Scale



Graph 2: Percentage of patients with different levels of anxiety based on Zung Self-Rating Anxiety Scale

Variables	Depression (n=63)	Anxiety (n=63)
Age	> 65 years (p= 0.004) *	> 65 years (p= 0.765)
NYHA class (II)	p= 0.024 *	p= 0.038*
NYHA class (III)	p= 0.017 *	p= 0.029*
Co-morbid conditions		
• Diabetes	p= 0.04*	p = 0.02*
• Angina	p= 0.032 *	p = 0.046 *
• Hypertension	p= 0.113	p= .239
History of MI/ stroke	p= 0.04*	p=0.909
Medications	Beta blockers (p= 0.021) *	Beta blockers (p=0.79)
	Statins (p=0.04) *	Statins (p=0.16)

Table 3: Possible predictors of depression and anxiety
* Significant relationship observed (p<0.05)

4. DISCUSSION:

This is one of the few studies that have examined the presence of depression and anxiety in HF patients among the Indian population. In this study, 71 % of patients could be considered as depressive while 24 % of patients had symptoms of anxiety. The finding is consistent with other studies suggesting that a significant percentage of patients with heart failure present with symptoms of depression as well. ^{15, 16} Previous studies evaluating the prevalence of depression in HF patients using different scales have reported a prevalence of 13-78%. ¹⁷ Murberg *et al.* used

the self-administered Zung tool showing a 13% prevalence of depression in HF patients.¹⁸ A study using the Beck Depression Inventory reported a prevalence of 51%¹⁹ while one study that used the self-reported Geriatric Depression Scale Short-Form reported 77.5% prevalence.¹⁶ In all, depression has been shown to be commonly present in HF patients. However, the difference in percentages of depression's incidence in different studies could be attributed to the use of different diagnostic tools, the varying sample size as well as to the differences in ethnicity among the study population.

NYHA class II and class III, presence of co-morbidities and advancing age showed a strong positive association between depression and heart failure, similar to previous studies.^{7, 20} An interesting observation in our study was that patients who were on beta blockers and statins had higher levels of depression compared to patients on other medications. How beta blockers or statins increase depression in HF patients is not known but may reflect an important consideration to the drug therapy of HF. A possible explanation for beta blocker-induced depression could be attributed to blockade of β_1 postsynaptic brain receptors by the drug, with resultant decrease in level of norepinephrine.²¹ A study by Thiessen *et al.* also found that patients on beta blocker therapy are often concurrently prescribed an antidepressant medication compared to patients receiving other cardiovascular drugs.²² In addition, unmarried status²⁰ and lack of social support²³ have also been shown as risk factors for depression and poor prognosis among HF patients though this was not analyzed in our study due to lack of adequate data.

Though fewer studies have evaluated anxiety disorders in the context of heart failure, the limited available data have shown that anxiety has a strong positive correlation in poor prognosis of HF patients.^{24, 25} Anxiety has been associated with a 26% increased incidence of IHD and cardiac death in previously healthy individuals.^{26, 27} A previous small self-report study investigating the prevalence of anxiety in heart failure patients noted a slightly higher prevalence rate of 28%²⁴ compared to 24% found in our study. The main predictors of anxiety in our study population included presence of comorbid conditions and NYHA class which was in line with earlier studies.⁷ Presence of comorbidities and its significant association with anxiety could reflect the difficulty in coping with multiple diseases, and hence later, in the prognosis. Presence of comorbidities results in greater functional impairment, reduced physical activity and social withdrawal, and possibly, a feeling of loneliness and helplessness about one's future. The end result is increased feelings of depression and anxiety. Non-adherence to medications in presence of mood disorder

can also be an important mediator facilitating the worsening of HF.

While both depression and anxiety are evident in HF patients, depression alone has been graded as an independent predictor of mortality in these patients. In a study by Jiang *et al.*, it was seen that despite the positive correlation of anxiety and depression in HF patients, only depression was associated with increased mortality at 1 year independent of cardiac risk factors and Trait-Anxiety.²⁸ In another study by Frasure *et al.*,²⁹ both depression and anxiety were significantly associated with mortality, but depression alone remained significant after adjustment for cardiovascular risk factors and severity of the disease. Philips *et al.* reported that presence of both depression and anxiety has been associated with a greater risk of cardiac deaths, possibly, by interacting synergistically to affect heart failure.³⁰

Why depression or anxiety in heart failure is associated with a poor prognosis is not clearly understood. Physiological changes including neurohormonal activation, changes in heart rate, inflammation and hypercoagulability that occur during the development and progression of HF are also shared by depression,³¹⁻³⁴ possibly hastening the disease progression. Moreover, patient's adherence to recommended medications is also adversely affected by depression, further contributing to worsening of the condition. Anxiety has been shown to accelerate the progression of atherosclerosis, decreased heart rate variability and increase the risk of ventricular arrhythmia, thus exhibiting an adverse association with IHD.^{35, 36} A possible link between anxiety and IHD via stress-induced release of catecholamines has also been suggested³⁷ though this remains to be established.

A significant limitation of our study was the small sample size which may have affected the prevalence rates. Patients were predominantly male and the impact of gender difference on depression, and thus, on the prognosis of heart failure could not be evaluated. Based on previous studies, it was seen that depression is more prevalent in women with IHD than men^{38, 39} but this could not be established in our population due to lack of comparable female study participants. Our study did not provide any data regarding the prognosis of HF patients with concurrent depression and anxiety. This aspect however needs to be studied, since reports from previous studies have emphasized on the poor prognosis and increased mortality risk in CHF patients with comorbid mood disorders. Finally the study does not provide any information on treatment referral and recovery of mood disorders after the HF patients have been diagnosed with symptoms of depression or anxiety. Further studies are warranted to analyse, the treatment pattern of HF patients

with associated depression or anxiety disorders, and also, the impact of depression on the progression of HF. Whether effective treatment of mood disorders lower cardiac mortality needs to be evaluated in the light of this study population.

Depression and anxiety are thus common in HF patients, the incident rate of depression being higher compared to anxiety. However, these mood disorders commonly go undiagnosed; 25%-45% of cases with depression are never detected by a medical professional.¹¹ It thus becomes increasingly important that clinicians, patients and caretakers realize that the presence of major depression or anxiety is not a standard part of living with HF. Since depression and anxiety increases the risk of IHD and overall cardiac morbidity and mortality, it is important that considerable effort be directed for their safe and effective management. Addressing the problems of depression or anxiety disorders in HF patients may help improve these patients' quality of life and potentially improve long-term outcomes in this vulnerable population.

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