

The prevalence of depression, stress and anxiety symptoms in patients with chronic heart failure

Nqoba Tsabedze (✉ Nqoba.Tsabedze@wits.ac.za)

<https://orcid.org/0000-0002-7210-1447>

Jamie-Leigh Kinsey

University of the Witwatersrand Faculty of Health Sciences

Dineo Mpanya

University of the Witwatersrand Faculty of Health Sciences <https://orcid.org/0000-0003-3769-4686>

Vanessa Mogashoa

University of the Witwatersrand Faculty of Health Sciences

Eric Klug

University of the Witwatersrand Faculty of Health Sciences

Pravin Manga

University of the Witwatersrand Faculty of Health Sciences

Research

Keywords: Depression, Stress, Anxiety, Chronic Heart Failure, Mental health, Psychosocial stressors

Posted Date: November 16th, 2020

DOI: <https://doi.org/10.21203/rs.3.rs-24137/v2>

License:  This work is licensed under a Creative Commons Attribution 4.0 International License.

[Read Full License](#)

Abstract

Background: Mental health illnesses are associated with frequent rehospitalisation and an increased risk of all-cause mortality. Despite the high prevalence of depression in patients with chronic heart failure (CHF), there is a paucity of data on this subject from low and middle-income countries (LMIC). This study aimed to determine the prevalence of depression, anxiety and stress symptoms in patients attending a dedicated chronic heart failure clinic.

Methods: A prospective study was conducted at an outpatient heart failure clinic in a tertiary academic centre. The study participants completed a Depression, Anxiety and Stress (DASS-21) questionnaire to screen for the presence and severity of depression, anxiety and stress symptoms. Furthermore, the Minnesota Living with Heart Failure Questionnaire (MLHFQ) was completed and used to evaluate the impact of CHF on health-related quality of life. Descriptive statistics were used to describe patients' characteristics and logistic regression analysis to identify predictors of symptoms of depression.

Results: The study population comprised of 103 patients, predominantly female (62.1%) with a median age of 53 (interquartile range 38 – 61) years. Symptoms of depression were reported by 52.4%, with 11.7% reporting symptoms suggestive of extremely severe depression. Anxiety was diagnosed in 53.4% of patients and extremely severe anxiety reported by 18.4% of patients. Fifty patients were classified as stressed, and only 7.7% had extremely severe stress. More than half of the patients (54.4%) were in New York Heart Association (NYHA) functional class I with a mean (SD) left ventricular ejection fraction (LVEF) of 30.5% (11.1). In the multivariable logistic regression model, permanent employment [odds ratio (OR) -1.22, 95% CI: -0.01 – -0.00, $p=0.012$], the six-minute walk test [OR -0.07, 95% CI: 0.02 – 0.06, $p=0.001$] and orthopnoea [OR 1.89, 95% CI: -0.01 – -0.00, $p=0.012$] were identified as independent predictors of depression.

Conclusion: Depression and anxiety symptoms were found in over half of patients attending the chronic heart failure clinic. We recommend that mental health screening should be routinely performed in patients with chronic heart failure. Prospective, adequately powered, multicentre studies from LMIC investigating the impact of depression, anxiety and stress on CHF hospitalisation and mortality are required.

Introduction

Chronic heart failure (CHF) is a clinical syndrome associated with a significant reduction in the quality of life of the patients affected [1]. Improving the health-related quality of life (HRQoL) is essential when managing CHF patients, particularly since most patients value the quality of life improvements more significantly than prolonging survival [2, 3]. Furthermore, mental health disorders may lead to an overall decreased HRQoL due to non-compliance to optimal medical therapy and follow-up. It has also been established that CHF accompanied by depression, anxiety and stress is associated with an increased rate of heart failure rehospitalisation and mortality [4-6].

Studies conducted in low and middle-income countries (LMIC) have demonstrated a positive correlation between mental health disorders and low levels of education, a poor socioeconomic status and financial stress [7, 8]. In the South African setting, the prevalence of depression, anxiety and stress in CHF patients is unknown. We hypothesize that it is likely to be higher than that of patients residing in developed countries due to confounding poor socioeconomic factors prevalent in LMIC [9]. This study aims to determine the prevalence of depression, anxiety and stress symptoms in patients diagnosed with CHF in a tertiary academic hospital in Johannesburg, South Africa.

Methods

We prospectively recruited consecutive patients attending the CHF outpatient clinic at the Charlotte Maxeke Johannesburg Academic Hospital (CMJAH), in Johannesburg, South Africa, between 01 January and 31 September 2016. The study commenced after receiving institutional ethical clearance and signed informed consent from all study participants. We included adults 18 years of age and older. Furthermore, the patients enrolled could all read and understand English. All study participants were provided with instructions on how to complete the English version of the Depression, Anxiety and Stress (DASS-21) questionnaire and the Minnesota Living with Heart Failure Questionnaire (MLHFQ). The questionnaires were completed while patients were awaiting their morning clinical consultation at the CHF clinic.

The DASS-21 questionnaire is a validated tool designed to measure the emotional states of depression, anxiety, and stress. Each scale contains seven items. The depression scale assesses dysphoria, hopelessness, devaluation of life, self-deprecation, lack of interest/involvement, anhedonia and inertia.

The anxiety scale assesses autonomic arousal, skeletal muscle effects, situational anxiety and subjective experience of anxious affect. In contrast, the stress scale assesses difficulty in relaxation, nervous arousal, irritability and lack of patience. The final score is obtained by multiplying the total score in each of the three scales by two [10].

The Minnesota Living with Heart Failure Questionnaire (MLHFQ) evaluates the impact of heart failure on the patients' HRQoL. It is a disease-specific questionnaire comprising of 21 items rated on a six-point Likert Scale, representing different degrees of the impact of CHF on HRQoL in the month before the current clinic visit, as perceived by the patient from 0 (none) to 5 (very much). The total score ranges between 0 and 105, where a higher score represents a low quality of life [11].

Furthermore, data about the sociodemographic factors (age, gender, ethnicity, employment status) and clinical parameters (blood pressure, body mass index, presence of heart failure symptoms, etc.) were collected using a data collection sheet designed for this study. Blood pressure measurements were taken from the right upper arm before and after the six-minute walk test. The weight and height were also measured from each study participant. The rest of the clinical data was obtained from the CHF clinic outpatient file.

Ethics approval

Research approval was granted by the Durban University of Technology (DUT) Research Ethics Committee as JH was a bachelor of technology student registered at DUT. This study formed part of her research report. Permission to access patient records was obtained from the relevant hospital authorities.

Statistical analysis

Categorical variables were expressed as numbers and percentages. All categorical variables were compared for the study outcome by using the Chi-square test. Continuous variables with a normal distribution were expressed as mean and standard deviation. The median and interquartile ranges (IQR) were used for continuous variables with a non-normal distribution. We compared normally distributed continuous variables using the Student t-test, and the Wilcoxon rank-sum (Mann-Whitney) test was used to compare medians for non-normal data. Variables with a p-value <0.5 for t-test, rank-sum test or Chi-squared were considered for further exploration in the univariable logistic regression model. Variables with a p-value of less than 0.1 were included in the multivariable logistic regression model. Confidence intervals were calculated at 95% interval levels, and differences were considered statistically significant at a p-value of less than 0.05. All statistics were generated with STATA MP Version 13.0 (StataCorp. Texas).

Results

The study population comprised of 103 patients with a median age of 53 (IQR: 38-61) years. Sixty-four patients (62.1%) were female and (71.8%) were black. Hypertension was the most prevalent comorbidity, seen in 37 (35.9%) participants. Only 13 (12.6%) patients had a history of ischaemic heart disease. Unemployment was reported by 67.9% of patients. Our patients were overweight with a mean body mass index (BMI) of 29 ± 6.2 kg/m². More than half of the patients (54.4%) were in New York Heart Association (NYHA) functional class I with a mean (SD) left ventricular ejection fraction (LVEF) of $30.5 \pm 11.1\%$.

Of the study participants, 98 (95.1%) were treated with beta-blockers, 94 (91.2%) were on angiotensin-converting enzyme (ACE) inhibitors or angiotensin receptor blockers (ARB), 89 (80.2%) were treated with diuretics and 76 (73.7%) with mineralocorticoid receptor antagonists. The rest of the demographic and clinical data are reported in Table 1.

Fifty-four (52.4%) patients met the diagnostic criteria for depressive symptoms, with severe and extremely severe depressive symptoms reported in 10 (9.7%) and 12 (11.6%) patients, respectively (Figure 1). Among the 54 patients with depressive symptoms, 72.7% also had symptoms of anxiety ($p=0.000$). Patients with symptoms of depression had a higher MLHFQ score [28 (10-54) vs. 5(0-17), $p=0.000$], and walked a shorter distance during the six-minute walk test [350 (300-425) vs. 375 (325-450), $p=0.008$]. The univariable logistic regression model demonstrated a positive linear relationship between symptoms of depression and the NYHA functional class II and III, a higher MLHFQ score and orthopnea. An inversely proportional relationship was noted with permanent employment and a further distance covered during the six-minute walk test. In the multivariable logistic regression model, permanent employment [odds ratio (OR) -1.22, 95% CI:-0.01– -0.00, $p=0.012$], a further distance walked during the six-minute walk

test [OR -0.07, 95%CI: 0.02 – 0.06, p=0.001] and orthopnoea [OR 1.89, 95% CI: -0.01 – -0.00, p=0.012] were identified as independent predictors of depression (Table 2).

Discussion

In this study, 52.4% of patients had symptoms of depression. This is significantly high compared to most studies in high-income countries. In a community-based study conducted in the United States of America, the prevalence of depression in CHF patients was 17% [12]. Furthermore, Haworth et al. studied 100 outpatients with heart failure in the United Kingdom and found the prevalence rate for anxiety and depression to be 18% and 29%, respectively [9]. The higher prevalence of symptoms of depression in our patients is likely influenced by socioeconomic factors unique to populations in LMIC. This hypothesis is supported by a study conducted in Pakistan, where the prevalence of depression in 170 patients with CHF was found to be 60% [13].

Anxiety and depression are common yet underreported in CHF and should not be overlooked when managing these patients. This is particularly important since both conditions are associated with poor outcomes. In a systematic review evaluating the prevalence, variance and measurement tools for anxiety in patients with heart failure, the pooled prevalence from 38 studies ranged from 6.3 to 72.3% [5]. In our study, anxiety and depression coexisted in 72.7% of patients, emphasizing the need to screen for both conditions since the treatment plan differs between the two states.

Potential mechanisms linking depression and anxiety with heart failure outcomes include inflammation, autonomic dysfunction, enhanced platelet aggregation, endothelial dysfunction, poor diet, smoking and reduced physical activity [14]. Data on the prevalence of stress in CHF patients is lacking. However, there is a well-established relationship between prolonged emotional or physical stress and activation of the autonomic nervous system, increasing the likelihood of myocardial infarction, arrhythmias, heart failure and sudden cardiac death [15, 16].

In a study by Gottlieb et al., involving 155 patients with heart failure, 48% of the participants met the diagnostic criteria for depression, based on the Beck Depression Inventory, and had a mean MLHFQ score of 54 ± 24 [17]. In our study, patients with symptoms of depression also had a higher median MLHFQ score of 28 (IQR: 10-54). However, in the multivariable logistic regression model, a higher MLHFQ score was not statistically significant as an independent predictor of depression since the 95% confidence interval includes 1.

The six-minute walk test is a simple, reproducible test sensitive to functional capacity changes [18]. Furthermore, a self-perceived feeling of depression is a determinant of a short six-minute walk test [19]. In our study, a longer distance walked during the six-minute walk test was associated with a reduced likelihood of symptoms of depression.

Permanent employment offers financial security and a sense of purpose in life, hence improving the HRQoL. In our study, only 29.2% of patients with permanent employment had symptoms of depression.

In the multivariable logistic regression model, permanent employment reduced the likelihood of having symptoms of depression. Similar findings were reported in a study involving 231 hospitalised patients with CHF in Greece, where unemployment was associated with a poor quality of life, anxiety and depression [20].

Other published predictors of depression in heart failure include a low socioeconomic status (OR 5.1, 95% CI 1.4 – 17.9), a previous depressive episode, smoking, a higher NYHA functional class and unmarried status [12, 21, 22]. In our cohort, the NYHA functional class was not an independent predictor of depression. Thirty-nine percent of patients in NYHA functional class I had symptoms of depression, compared to only 18.5% in NYHA functional class III, suggesting that other confounding factors such as socioeconomic status play an important role in acquiring symptoms of depression.

Study Limitations

This study was limited by a small sample size and patient enrolment from a single medical centre. Patients were recruited over a short period, and only included study participants who could communicate in English. In our study, the DASS-21 questionnaire was the only tool used to assess for symptoms of depression, stress and anxiety and patients were not subsequently interviewed by a psychologist or psychiatrist. We are mindful that the prevalence of the symptoms of depression is significantly influenced by the measurement tool used. To the best of our knowledge, there are no data suggesting that the DASS-21 questionnaire under or overestimates the prevalence of depression, stress and anxiety. Lastly, this study was a cross-sectional analysis with no patient follow-up data to assess for the progression of symptoms of depression, anxiety or stress.

Conclusion

Symptoms of depression and anxiety were found in more than 50% of patients with chronic heart failure. Based on these findings, mental health screening should be considered in all patients with chronic heart failure with appropriate referral pathways to psychologists and psychiatrists. We recommend that prospective, multicentre studies from LMIC be conducted using multiple tools to screen for depression, anxiety and stress and investigate the impact of these on heart failure hospitalisation and mortality.

Declarations

Acknowledgment: The authors would like to thank the staff members at the Charlotte Maxeke Johannesburg Academic Hospital Heart failure clinic as well as the patients that participated in the study.

Funding/ conflict of Interest: None

Disclaimer: None

References

1. Juenger J, Schellberg D, Kraemer S, et al. Health related quality of life in patients with congestive heart failure: comparison with other chronic diseases and relation to functional variables. *Heart*. 2002;87(3):235-41 DOI: 10.1136/heart.87.3.235.
2. Rector TS, Tschumperlin LK, Kubo SH, et al. Use of the Living With Heart Failure questionnaire to ascertain patients' perspectives on improvement in quality of life versus risk of drug-induced death. *J Card Fail*. 1995;1(3):201-6 DOI: 10.1016/1071-9164(95)90025-x.
3. Lewis EF, Johnson PA, Johnson W, et al. Preferences for quality of life or survival expressed by patients with heart failure. *The Journal of Heart and Lung Transplantation*. 2001;20(9):1016-24 DOI: 10.1016/S1053-2498(01)00298-4.
4. Wu A. Heart Failure. *Ann Intern Med*. 2018;168(11):ITC81-ITC96 DOI: 10.7326/AITC201806050.
5. Easton K, Coventry P, Lovell K, et al. Prevalence and Measurement of Anxiety in Samples of Patients With Heart Failure: Meta-analysis. *J Cardiovasc Nurs*. 2016;31(4):367-79 DOI: 10.1097/JCN.0000000000000265.
6. Sokoreli I, De Vries JGG, Pauws SC, Steyerberg EW. Depression and anxiety as predictors of mortality among heart failure patients: systematic review and meta-analysis. *Heart Fail Rev*. 2016;21(1):49-63 DOI: 10.1007/s10741-015-9517-4.
7. Lund C, Breen A, Flisher AJ, et al. Poverty and common mental disorders in low and middle income countries: A systematic review. *Social science & medicine (1982)*. 2010;71(3):517-28 DOI: 10.1016/j.socscimed.2010.04.027.
8. Patel V, Kleinman A. Poverty and common mental disorders in developing countries. *Bull World Health Organ*. 2003;81(8):609-15.
9. Haworth JE, Moniz-Cook E, Clark AL, et al. Prevalence and predictors of anxiety and depression in a sample of chronic heart failure patients with left ventricular systolic dysfunction. *Eur J Heart Fail*. 2005;7(5):803-8 DOI: 10.1016/j.ejheart.2005.03.001.
10. Lovibond S, Pf. L. *Manual for the Depression, Anxiety and Stress scales*. second ed. Sydney: Psychology Foundation; 1995.
11. Garin O, Ferrer M, Pont A, et al. Evidence on the global measurement model of the Minnesota Living with Heart Failure Questionnaire. *Qual Life Res*. 2013;22(10):2675-84 DOI: 10.1007/s11136-013-0383-z.
12. Chobufo MD, Khan S, Agbor VN, et al. 10-Year trend in the prevalence and predictors of depression among patients with heart failure in the USA from 2007-2016. *Int J Cardiol*. 2019 DOI: 10.1016/j.ijcard.2019.09.028.
13. Zahid I, Baig MA, Ahmed Gilani J, et al. Frequency and predictors of depression in congestive heart failure. *Indian Heart J*. 2018;70 Suppl 3:S199-S203 DOI: 10.1016/j.ihj.2018.10.410.
14. Celano CM, Villegas AC, Albanese AM, et al. Depression and Anxiety in Heart Failure: A Review. *Harv Rev Psychiatry*. 2018;26(4):175-84 DOI: 10.1097/HRP.0000000000000162.
15. Torpy JM, Burke AE, Glass RM. JAMA patient page. Acute emotional stress and the heart. *JAMA*. 2007;298(3):360 DOI: 10.1001/jama.298.3.360.

16. Ueyama T, Kasamatsu K, Hano T, et al. Catecholamines and estrogen are involved in the pathogenesis of emotional stress-induced acute heart attack. *Ann N Y Acad Sci.* 2008;1148:479-85 DOI: 10.1196/annals.1410.079.
17. Gottlieb SS, Khatta M, Friedmann E, et al. The influence of age, gender, and race on the prevalence of depression in heart failure patients. *J Am Coll Cardiol.* 2004;43(9):1542-9 DOI: 10.1016/j.jacc.2003.10.064.
18. Lipkin DP, Scriven AJ, Crake T, Poole-Wilson PA. Six minute walking test for assessing exercise capacity in chronic heart failure. *British Medical Journal (Clinical research ed).* 1986;292(6521):653-5 DOI: 10.1136/bmj.292.6521.653.
19. Ingle L, Rigby AS, Nabb S, et al. Clinical determinants of poor six-minute walk test performance in patients with left ventricular systolic dysfunction and no major structural heart disease. *Eur J Heart Fail.* 2006;8(3):321-5 DOI: 10.1016/j.ejheart.2005.08.006.
20. Aggelopoulou Z, Fotos NV, Chatziefstratiou AA, et al. The level of anxiety, depression and quality of life among patients with heart failure in Greece. *Appl Nurs Res.* 2017;34:52-6 DOI: 10.1016/j.apnr.2017.01.003.
21. Graven LJ, Martorella G, Gordon G, et al. Predictors of depression in outpatients with heart failure: An observational study. *Int J Nurs Stud.* 2017;69:57-65 DOI: 10.1016/j.ijnurstu.2017.01.014.
22. Lossnitzer N, Herzog W, Stork S, et al. Incidence rates and predictors of major and minor depression in patients with heart failure. *Int J Cardiol.* 2013;167(2):502-7 DOI: 10.1016/j.ijcard.2012.01.062.

Tables

Table 1. Demographic and clinical characteristics of patients with chronic heart failure

Variable	Depression			p- value
	Total (n=103)	No (n=49)	Yes (n=54)	
Age, years	53 (38-61)	54 (38-62)	53 (38-61)	0.982
Females, n (%)	64 (62.1)	27 (55.1)	37 (68.5)	0.161
Ethnicity, n (%)				0.923
Black	74 (71.8)	37 (75.5)	37 (68.5)	
White	12 (11.6)	5 (10.2)	7 (12.9)	
Indian	11(10.7)	4 (8.2)	7 (12.9)	
Mixed Ancestry	4 (3.9)	2 (4.1)	2 (3.7)	
Other	2 (1.9)	1 (2.0)	1 (1.9)	
Employment status, n (%)				0.021
unemployed	70 (67.9)	27 (55.1)	43 (79.6)	
part-time	9 (8.7)	5 (10.2)	4 (7.4)	
permanent	24 (23.3)	17 (34.7)	7 (12.9)	
Vital signs				
systolic BP	124 (110-137)	124 (110-140)	123 (109-134)	0.498
diastolic BP	73 (66-85)	73 (69-85)	75 (66-84)	0.871
MAP (mmHg)	92.1 (13.9)	92.8 (12.7)	91.5 (15.1)	0.643
pulse (bpm)	72 (64-79)	71 (64-78)	72 (63-79)	0.731
MLHFQ score	16 (0-40)	5 (0-17)	28 (10-54)	0.000
BMI (kg/m ²)	29 (6.2)	29.5 (4.7)	28.8 (7.4)	0.555
Six-minute walk test (metres)	350 (300-450)	375 (325-450)	350 (300-425)	0.008
LVEF (%)	30.5 (11.1)	30.5 (10.4)	30.4 (11.9)	0.494
NYHA class, n (%)				0.004
I	56 (54.4)	35 (71.4)	21 (38.9)	
II	33 (32.0)	10 (20.4)	23 (42.6)	
III	14 (13.6)	4 (8.2)	10 (18.5)	
Symptoms, n (%)				
orthopnoea	11 (10.7)	2 (4.1)	9 (16.7)	0.039
dyspnoea	16 (15.5)	5 (10.2)	11 (20.4)	0.155
PND	10 (9.7)	3 (6.1)	7 (12.9)	0.242

fatigue	17 (16.5)	6 (12.2)	11 (20.4)	0.267
---------	-----------	----------	-----------	-------

Dichotomous variables are represented as absolute numbers and percentages (%). Data showed a mean and standard deviation (SD) for continuous variables with a normal distribution and as a median and interquartile range (25th - 75th percentile) for continuous variables with a skewed distribution. BP= blood pressure; BMI= body mass index; MAP= mean arterial pressure; MLHFQ= Minnesota Living with Heart Failure Questionnaire; NYHA= New York Heart Association; PND=paroxysmal nocturnal dyspnoea; LVEF = left ventricular ejection fraction

Table 2. Logistic regression analysis for predictors of depression

	<u>Univariable regression</u>			<u>Multivariable regression</u>		
	OR	p-value	95% CI	OR	p-value	95% CI
NYHA class II	3.83	0.004	1.53 - 9.60			
NYHA class III	4.17	0.029	1.16 - 14.97			
Permanent employment	0.26	0.008	0.09 - 0.71	- 1.22	0.012	- 0.01 - -0.00
Six-minute walk test	0.99	0.005	0.99 - 1.00	- 0.07	0.001	0.02 - 0.06
MLHFQ score	1.04	0.000	1.02 - 1.06	0.04	0.054	- 0.03 - 3.82
Orthopnoea	4.50	0.054	0.97 - 20.83	1.89	0.012	- 0.01 - -0.00

MLHFQ = Minnesota living with heart failure questionnaire; NYHA= New York Heart Association

Figures

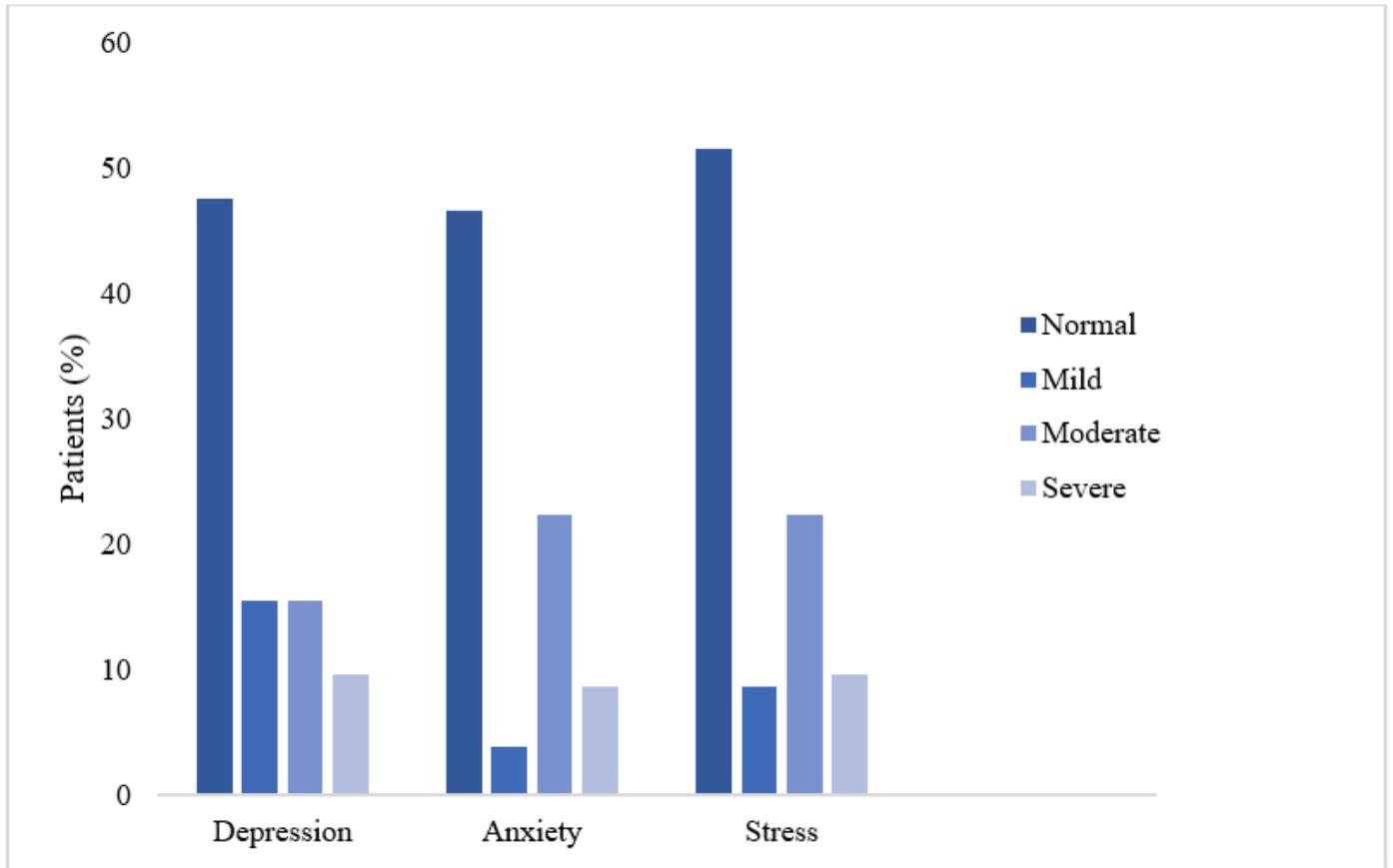


Figure 1

Graph showing chronic heart failure patients with depression, anxiety and stress stratified according to the severity

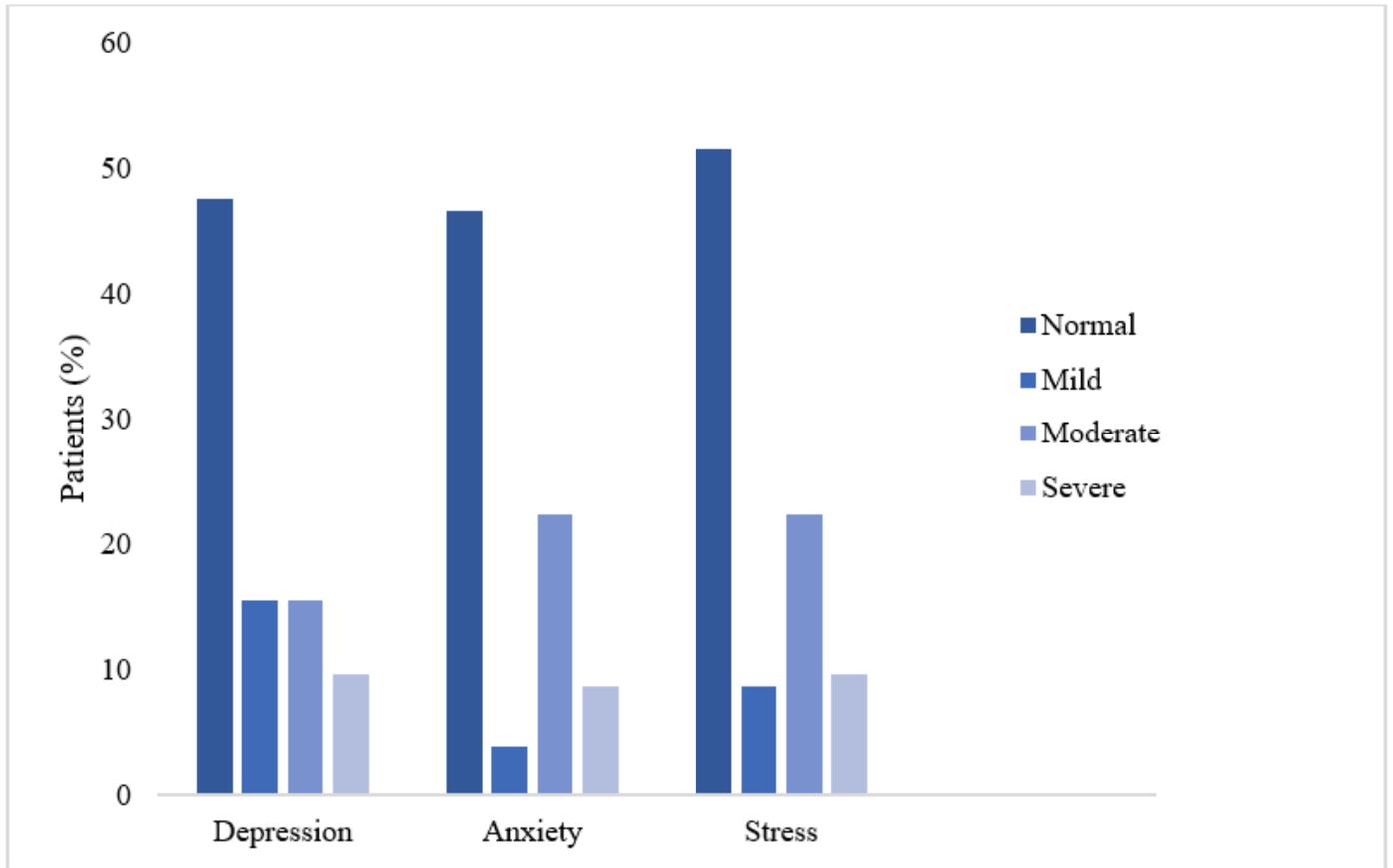


Figure 1

Graph showing chronic heart failure patients with depression, anxiety and stress stratified according to the severity