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Predictors of Absence of Depression in Hospitalized Patients with Heart Failure and Reduced Ejection Fraction

Hastaneye Yatırılarak Tedavi Edilen Düşük Ejeksiyon Fraksiyonlu Kalp Yetersizliği Hastalarında Depresyon Saptanmamasıyla İlişkili Göstergeler

ABSTRACT

Objective: Mental health is directly related to mortality in heart failure (HF) patients. Nevertheless, depression is often underdiagnosed and undertreated in HF patients. We aimed to determine the parameters associated with the absence of depression in hospitalized HF patients.

Method: A total of 143 hospitalized HF patients with reduced ejection fraction were included in this study. The Patient Health Questionnaire-9 (PHQ-9) scale was used for screening depression symptoms. HF patients who scored < 5, defined as patients without depression, were compared with HF patients who scored ≥ 5.

Results: Depression was absent in 65 (45.5%) of the 143 hospitalized HF patients. Diabetes mellitus (P = 0.006) and beta-blocker usage (P = 0.011) were less frequent; New York Heart Association (NYHA) class (P = 0.003) and B-type natriuretic peptide (BNP) levels (P = 0.006) were lower; and estimated glomerular filtration rate (eGFR) levels (P = 0.038) were higher in HF patient without depression in our study. In multivariate analysis, NYHA class [P = 0.003, odds ratio (OR) (95% confidence interval [CI]) 0.426 (0.242-0.751)] and beta-blocker usage [P = 0.045, OR (95% CI) 0.288 (0.085-0.972)] were independently correlated with the absence of depression in hospitalized HF patients. Correlation analysis revealed a significant positive correlation between NYHA class and PHQ-9 score (r = 0.258, P = 0.002).

Conclusion: In our study, 45.5% of the hospitalized HF patients had no depression. Diabetes mellitus and beta-blocker usage were less frequent, NYHA class and BNP levels were lower, and eGFR levels were higher in HF patients without depression. Additionally, NYHA class and beta-blocker usage were independent predictors of the absence of depression in hospitalized HF patients. This study highlights the need for physicians to recognize the strong interaction between depression and HF and to incorporate regular depression screening into clinical practice.

Keywords: Depression, heart failure, Patient Health Questionnaire-9

ÖZET

Amaç: Sağlıklı ruhsal durum kalp yetmezliği (KY) hastalarında ölüm oranlarıyla doğrudan ilişkilidir. Buna rağmen depresyon, KY hastalarında yeterince teşhis ve tedavi edilememektedir. Çalışmamızda, hastaneye yatırılarak tedavi edilen KY hastalarında depresyon saptanmamasıyla ilişkili parametreleri araştırmayı amaçladık.

Yöntem: Bu çalışmaya hastaneye yatırılarak tedavi edilen 143 düşük ejeksiyon fraksiyonlu KY hastası dahil edildi. Depresif semptomların taranmasında Hasta Sağlık Anketi 9 (PHQ-9) kullanıldı. Hastalar PHQ-9 puanlamalarına göre sınıflandırıldı. PHQ-9 puanı <5 olan depresyonu olmayan KY hastaları ile PHQ-9 puanı ≥5 olan hastalar karşılaştırıldı.

Bulgular: Hastaneye yatırılarak tedavi edilen 143 KY hastasının 65'inde (%45.5) depresyon saptanmadı. Depresyonu olmayan hastalarda diyabet (P = 0.006) ve B-bloker kullanımı (P = 0.011) daha az, NYHA sınıfı (P = 0.003), BNP seviyeleri (P = 0.006) daha düşük, eGFR seviyeleri (P = 0.038) ise daha yüksek saptandı. Çok değişkenli regresyon analizinde, NYHA sınıfı [P = 0.003, OR (95%CI) 0.426 (0.242–0.751)] ve B-bloker kullanımı [P = 0.045, OR (95%CI) 0.288 (0.085-0.972)] KY hastalarında depresyon saptanmamasının bağımsız bir öngördürücüsü idi. Korelasyon analizinde, NYHA sınıfı ile PHQ-9 skoru arasında pozitif korelasyon saptandı (r=0.258, P = 0.002).

Sonuç: Hastaneye yatırılarak tedavi edilen KY hastalarının %45.5'inde depresyon saptanmadı. Depresyon saptanmayan hastalarda diyabet ve B-bloker kullanımı daha az, NYHA sınıfı, BNP seviyeleri daha düşük, eGFR seviyeleri (P = 0.038) ise daha yüksek saptandı. Ayrıca NYHA sınıfı ve B-bloker kullanımı depresyon saptanmamasının bağımsız bir öngördürücüsü idi. Bu çalışma, KY ile depresyon arasındaki kuvvetli etkileşime dikkat çekmekte ve hekimlerin depresyon taramasını klinik pratiklerine dahil etmesi gerektiğini vurgulamaktadır.

Anahtar Kelimeler: Depresyon, kalp yetersizliği, Hasta Sağlık Anketi 9

ORIGINAL ARTICLE
KLİNİK ÇALIŞMA

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Mental health is directly related to mortality in heart failure (HF) patients.[1] Depression is a common comorbidity in heart failure, with 14% to 63% of HF patients experiencing depressive symptoms.[2-4] The relationship between depression and HF is not fully understood. Both conditions share similar risk factors and mechanisms, including endothelial dysfunction, inflammation, platelet hyperactivation, autonomic dysfunction, arrhythmias, neuroendocrine dysfunction, and social factors.[5,6]

Depression is associated with poor adherence to medication, increased hospitalization rates, and higher morbidity and mortality in HF patients.[1] Therefore, identifying depressive symptoms in HF patients is critical for improving both quality of life and survival outcomes.

Current HF guidelines recommend screening for depression in HF patients.[7,8] However, depressive symptoms are often underdiagnosed and undertreated.[9] Several factors contribute to this issue, with the primary reason being insufficient awareness among clinicians about depression.[10] Additionally, the overlap between acute HF symptoms and depressive symptoms, variations in depressive symptom presentation, and associated comorbidities pose challenges for clinicians in diagnosing depression.[11]

The Patient Health Questionnaire-9 (PHQ-9) is a screening tool comprising nine diagnostic questions for depression based on the criteria outlined in the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM 4).[12] The PHQ-9 is a suitable method for detecting depressive symptoms in HF patients.[13,14] This study aims to investigate the parameters associated with the absence of depression in hospitalized heart failure patients.

Materials and Methods

A total of 143 hospitalized HF patients with reduced ejection fraction (EF) were included in the study. Depressive symptoms were screened using the Turkish version of the PHQ-9.[15-18] The PHQ-9 is based on nine questions aligned with the DSM-IV diagnostic criteria for depressive disorders. This questionnaire evaluates insomnia, anhedonia, fatigue, trouble sleeping, feelings of worthlessness or guilt, depressed mood, changes in appetite, suicidal thoughts, difficulty concentrating, and restlessness.[12] Each question is scored on a scale from 0 to 3 (not at all–every day). The points are summed to calculate a total score ranging from 0 to 27. All patients were evaluated using the PHQ-9 during their clinical visit.

A notable relationship exists between the severity of depressive symptoms and cardiac events. Even mild depressive symptoms increase the risk of adverse outcomes.[19] However, patients with mild depressive symptoms are often categorized as having no depression in several studies. Consequently, classifying patients with low depression scores as having no depression may weaken the observed relationship between depression and the prognosis of HF. In this study, patients with PHQ-9 scores < 5 were considered to have no depression. We prioritized investigating the characteristics of patients with no depression. Additionally, patients with higher PHQ-9 scores were referred to a psychiatrist.

Inclusion criteria included age >18 years, hospitalization for HF, and an EF ≤ 40%. Exclusion criteria included a history of malignancy, difficulty communicating, and transient ischemic attack or stroke within the past three months.

ABBREVIATIONS

DSM 4	Diagnostic and Statistical Manual of Mental Disorders
EF	Ejection fraction
HF	Heart failure
LV	Left ventricular
PHQ9	Patient Health Questionnaire 9

The New York Heart Association (NYHA) classification was used to define the severity of HF:

- Class I: No restriction in daily activities and exercise.
- Class II: Slight restriction in daily activities and marked restriction in exercise.
- Class III: Marked restriction in daily activities but no symptoms at rest.
- Class IV: Symptoms present at rest.[20]

This study was approved by the Non-Invasive Clinical Ethics Committee of Kocaeli University (Approval Number: KÜ GOKAEK 2018/132, Date: 21.03.2018) in accordance with the Declaration of Helsinki. Written informed consent was obtained from all participants.

Statistical Analysis

Statistical analyses were conducted using SPSS version 13.0 (SPSS Inc., IBM, Chicago, USA). The Kolmogorov-Smirnov test was used to analyze the distribution of parameters. Categorical variables were presented as percentages and frequencies. Normally distributed parameters were expressed as mean ± standard deviation (SD), while abnormally distributed parameters were presented as median and percentiles (25^{th}-75^{th} percentiles). Pearson analysis was used to evaluate the linear association between two continuous variables, while Spearman analysis was employed to assess associations between two ordinal or continuous parameters. Categorical variables were analyzed using the Chi-square test. Normally distributed continuous variables were compared using a two-tailed Student's t-test, while abnormally distributed variables were evaluated with the Mann-Whitney U test.

Multivariate and univariate logistic regression analyses were conducted to evaluate the clinical determinants of the absence of depression in hospitalized HF patients. NYHA class, diabetes mellitus (DM), beta-blocker usage, and estimated glomerular filtration rate (eGFR) levels were found to be significant in univariate logistic regression analyses. Parameters that were statistically significant were included in the multivariate logistic regression analysis. In this model, NYHA class and beta-blocker usage were identified as independent predictors of a healthy mental condition.

Results

A total of 143 hospitalized HF patients with reduced EF were included in the study. The patients were divided into two groups: HF patients with no depression (PHQ-9 score < 5) and those with PHQ-9 scores ≥ 5.

Table 1. Baseline Characteristics and Echocardiographic Parameters of the Groups

	Heart failure patients with PHQ-9 Score ≥ 5 (n = 78)	Heart failure patients with no depression (PHQ-9 Score < 5) (n = 65)	P
Age (years)	69.5 ± 12.6	69.7 ± 11.1	0.924
Gender (male/female)	48/30 (61.5-38.5%)	41/24 (63.1-36.9%)	0.494
Body mass ındex (kg/m^2)	28.3 ± 5.8	30.3 ± 7	0.087
Hypertension	74 (94.9%)	56 (86.2%)	0.065
Diabetes mellitus	40 (51.3%)	19 (29.2%)	0.006
Coronary artery disease	39 (50%)	29 (44.6%)	0.318
Atrial fibrillation	22 (28.2%)	20 (31.3%)	0.493
NYHA class	3.1 ± 0.73	2.7 ± 0.83	0.003
Heart rate (beats/min)	79 ± 9	81 ± 9	0.671
PHQ-9 score	9.1 ± 5.7	2.4 ± 1.4	<0.001
Degree of depressive symptoms			
No or minimal (0-4 points)	65 (45.5%)		
Mild (5-9 points)	57 (39.8%)		
Moderate (10-14 points)	7 (4.9%)		
Moderate-severe (15-19 points)	9 (6.3%)		
Severe (20-27 points)	5 (3.5%)		
Echocardiographic parameters			
LVEF (%)	32 ± 19.2	29.2 ± 16.4	0.472
LVEDD (mm)	5.4 ±1.8	5.6 ± 1.3	0.503
LVESD (mm)	3.8 ± 1.6	4.1 ± 1.1	0.328
Left atrium diameter (mm)	4.9 ± 0.9	4.9 ± 1	0.961
PASP (mmHg)	57 ±14	54 ± 16	0.521
Ascending aorta diameter (cm)	3.45 ± 0.5	3.48 ± 0.6	0.836

LVEDD, Left Ventricular End Diastolic Diameter (mm); LVEF, Left Ventricular Ejection Fraction; LVESD, Left Ventricular End Systolic Diameter (mm); NYHA, New York Heart Association; PASP, Pulmonary Artery Systolic Pressure (mmHg); PHQ-9, The Patient Health Questionnaire-9.

Patients with no depression had a mean age of 69.7 ± 11.1 years, while patients with PHQ-9 scores ≥ 5 had a mean age of 69.5 ± 12.6 years (P = 0.924). Male patients accounted for 63.1% of those with no depression and 61.5% of those with PHQ-9 scores ≥ 5. Gender distribution was similar between the groups (P = 0.494). The body mass index (BMI) was 30.3 ± 7 kg/m^2 for patients with no depression and 28.3 ± 5.8 kg/m^2 for patients with PHQ-9 scores ≥ 5, with no statistically significant difference between the groups (P = 0.087). Among the patients with no depression, 29.2% had diabetes mellitus, compared to 51.3% of patients with PHQ-9 scores ≥ 5. DM rates were significantly lower in patients with no depression compared to those with a PHQ-9 score ≥ 5 (P = 0.006). However, hypertension, atrial fibrillation, and coronary artery disease did not show significant differences between patients with no depression and those patients with a PHQ-9 score ≥ 5 (P = 0.065, P = 0.493, and P = 0.318, respectively). The NYHA class was lower in patients with no depression compared to those with a PHQ-9 score ≥ 5 (2.7 ± 0.83 vs. 3.1 ± 0.73, P = 0.003). Heart rate was similar between the groups (P = 0.617).

In this study, 45.5% of the patients had a PHQ-9 score < 5, 39.8% had a PHQ-9 score between 5 and 9, 4.9% had a PHQ-9 score ≥ 10, 6.3% had a PHQ-9 score between 15 and 19, and 3.5% had a PHQ-9 score ≥ 20.

EF was 29.2 ± 16.4 in patients with no depression and 32 ± 19.2 in patients with a PHQ-9 score ≥ 5. EF was not significantly different between the groups (P = 0.472). Left ventricular (LV) end-diastolic diameter (P = 0.503), LV end-systolic diameter (P = 0.328), left atrium diameter (P = 0.961), pulmonary artery systolic pressure (P = 0.521), and ascending aorta diameter (P = 0.836) were also similar between the groups. Baseline characteristics, echocardiographic, and angiographic parameters are presented in Table 1.

Beta-blocker usage was lower in patients with no depression compared to those with a PHQ-9 score ≥ 5 [48 (73.8%) vs. 70 (89.7%), P = 0.011]. Angiotensin-converting enzyme inhibitors (ACE-I) or angiotensin receptor blockers (ARB) (P = 0.266), thiazides (P = 0.236), acetylsalicylic acid (P = 0.235), anticoagulants (P = 0.163), statins (P = 0.106), calcium channel blockers (P = 0.409), spironolactone (P = 0.118), and clopidogrel (P = 0.259) usage were similar between the groups.

Glucose levels were 119 ± 44 mg/dL in patients with no depression and 134 ± 57 mg/dL in patients with PHQ-9 scores ≥

Table 2. Hematological, Biochemical Parameters, and Medications of the Groups

	Heart failure patients with PHQ-9 Score ≥ 5 (n = 78)	Heart failure patients with no depression (PHQ-9 Score < 5) (n = 65)	P
Medications			
ACE-I or ARBs	19 (62.8%)	45 (69.2%)	0.266
Beta-blocker	70 (89.7%)	48 (73.8%)	0.011
Thiazide	22 (28.2%)	14 (21.5%)	0.236
Acetylsalicylic acid	41 (52.6%)	39 (60%)	0.235
Anticoagulants	21 (28.8%)	22 (33.8%)	0.163
Statins	38 (48.7%)	24 (36.9%)	0.106
Calcium channel blockers	8 (10.3%)	5 (7.7%)	0.409
Spironolactone	25 (32.1%)	28 (43.1%)	0.118
Clopidogrel	19 (24.4%)	12 (18.5%)	0.259
Hematological and biochemical parameters			
CRP (mg/dL)	4.4 ± 18.8	3 ± 5.3	0.466
Glucose (mg/dL)	134 ± 57	119 ± 44	0.017
HbA1c	6.9 ± 1.3	6.2 ± 1.5	0.02
Hemoglobin (g/dL)	11.9 ± 2.2	11.9 ± 2	0.848
Hematocrit (%)	36 ± 6	36.2 ± 6.3	0.835
Platelet (x1000/μL)	232 ± 110	244 ± 84	0.480
WBC (x1000/mm^3)	9.4 ± 9	10.2 ± 8.9	0.580
Sedimentation (mm/hour)	27 ± 20	30 ± 29	0.728
eGFR (mL/min)	64 ± 40	81 ± 44	0.038
Creatinine (mg/dL)	1.96 ± 1.82	1.32 ± 0.97	0.017
Urea (mg/dL)	76 ± 41	68 ± 37	0.234
AST (U/L)	21 (15-33)	22 (15-33)	0.703
ALT (U/L)	33 ± 47	32 ± 45	0.932
Total cholesterol (mg/dL)	139 ± 29	157 ± 44	0.128
Triglyceride (mg/dL)	108 ± 40	120 ± 51	0.236
LDL-cholesterol (mg/dL)	91 ± 26	95 ± 30	0.594
HDL-cholesterol (mg/dL)	38 ± 15	41 ± 13	0.449
TSH (mIU/L)	2.4 ± 2.3	2.3 ± 2.2	0.849
BNP (ng/L)	6635 (2018-15000)	3340 (1568-10350)	0.006
Albumin (g/dL)	3.2 ± 0.9	3.4 ± 0.6	0.124
Uric acid (mg/dL)	7.1 ± 3	6.4 ± 2.4	0.154

ACE-I, Angiotensin-Converting Enzyme Inhibitor; ALT, Alanine Transaminase; ARB, Angiotensin Receptor Blocker; AST, Aspartate Transaminase; BNP, B-Type Natriuretic Peptide; CRP, C-Reactive Protein; eGFR, Estimated Glomerular Filtration Rate; HDL, High-Density Lipoprotein; LDL, Low-Density Lipoprotein; TSH, Thyroid Stimulating Hormone; WBC, White Blood Cell Count.

5 (P = 0.017). Glucose was lower in patients with no depression compared to those with PHQ-9 scores ≥ 5 (P = 0.017). Similarly, hemoglobin A1c (HbA1c) was 6.2 ± 1.5 in patients with no depression and 6.9 ± 1.3 in patients with PHQ-9 scores ≥ 5 (P = 0.002). HbA1c levels were lower in patients with no depression compared to those with a PHQ-9 score ≥ 5 (P = 0.02). The eGFR was 81 ± 44 mL/min in patients with no depression and 64 ± 40 mL/min in patients with PHQ-9 scores ≥ 5. eGFR was significantly higher in patients with no depression compared to those with PHQ-9 scores ≥ 5 (P = 0.038). Creatinine levels were 1.32 ± 0.97 mg/dL in patients with no depression and 1.96 ± 1.82 mg/dL in patients with PHQ-9 scores ≥ 5, with significantly lower levels in the no-depression group (P = 0.017). Brain natriuretic peptide (BNP) levels were 3340 (1568-10,350) ng/L in patients with no depression and 6635 (2018-15,000) ng/L in patients with PHQ-9 scores ≥ 5. BNP levels were significantly lower in patients with no depression compared to those with PHQ-9 scores ≥ 5 (P = 0.006). Other hematological and biochemical parameters did not show statistically significant differences between the groups. Medications, biochemical, and hematological parameters are presented in Table 2.

Table 3. Univariate and Multivariate Correlations of No Depression in Hospitalized Heart Failure (HF) Patients

Variables	Univariate regression coefficient (95% CI)	P	Multivariate regression coefficient (95% CI)	P
NYHA class	0.517 (0.330–0.811)	0.004	0.426 (0.242–0.751)	0.003
Diabetes Mellitus	0.392 (0.196–0.786)	0.008	0.496 (0.217–1.130)	0.095
B-Blocker Usage	0.323 (0.129–0.807)	0.016	0.288 (0.085–0.972)	0.045
eGFR	1.009 (1.000–1.019)	0.042	1.008 (0.998–1.018)	0.126

BNP, B-Type Natriuretic Peptide; CI, Confidence Interval; eGFR, Estimated Glomerular Filtration Rate; NYHA, New York Heart Association.

To determine the independent parameters associated with the absence of depression in HF patients, we conducted multivariate and univariate logistic regression analyses. In the univariate logistic regression analysis, the NYHA class [P = 0.004, odds ratio (OR) (95% confidence interval [CI]) 0.517 (0.330–0.811)], DM [P = 0.008, OR (95% CI) 0.392 (0.196–0.786)], beta-blocker usage [P = 0.016, OR (95% CI) 0.323 (0.129–0.807)], and eGFR [P = 0.042, OR (95% CI) 1.009 (1.000–1.019)] were found to be significant. Parameters identified as significant were included in the multivariate logistic regression analysis. In this model, NYHA class [P = 0.003, OR (95% CI) 0.426 (0.242–0.751)] and beta-blocker usage [P = 0.045, OR (95% CI) 0.288 (0.085–0.972)] were independently associated with the absence of depression in hospitalized HF patients. The univariate and multivariate correlations for the absence of depression in hospitalized HF patients are presented in Table 3.

In the correlation analysis, a positive correlation was observed between NYHA class and PHQ-9 score (r = 0.258, P = 0.002).

Discussion

Mental health is closely associated with morbidity, mortality, and hospitalization rates in HF patients.[1] In our study, 45.5% of hospitalized HF patients were found to have no depression. Despite the high prevalence of depression and its relationship with mortality in HF patients, depression is often underrecognized and undertreated by physicians.[21,22] Current American College of Cardiology/American Heart Association (ACC/AHA) and European Society of Cardiology (ESC) HF guidelines recommend increasing awareness of depression in HF patients. Physicians should routinely screen HF patients for depressive symptoms.[7,8] In this study, DM and beta-blocker usage were less frequent, NYHA class and BNP levels were lower, and eGFR levels were higher in HF patients with no depression. In multivariate analysis, NYHA class and beta-blocker usage emerged as independent predictors of the absence of depression in hospitalized HF patients.

The NYHA classification is the most widely recognized system for assessing the severity of HF. Rutledge et al.[2] demonstrated that NYHA class significantly impacts depression in HF patients. The prevalence of depression in NYHA class III HF patients was approximately double that of NYHA class II HF patients. Oyan et al.[23] also found a significant relationship between NYHA class and depression. Similarly, Zahid et al.[24] showed a strong association between depression and NYHA class III and IV HF. Patients with higher NYHA classes exhibit significantly higher rates of depression compared to those with lower NYHA classes, consistent with previous studies.[22,25] In our study, the NYHA class was lower and an independent predictor of the absence of depression. Additionally, a significant positive correlation was observed between NYHA class and PHQ-9 scores in the correlation analysis. Severe symptoms and physical limitations associated with HF can increase the risk of depressive symptoms in patients with advanced stages of HF.

Beta-blockers are key medications proven to reduce mortality in HF patients with reduced EF. For more than half a century, beta-blockers have been associated with depression as an adverse effect. Li et al.[26] demonstrated in their systematic review and network meta. analysis that beta-blocker usage may be a risk factor for depression in hypertensive patients. However, the relationship between beta-blockers and depression is still controversial. Riemer et al.[27] evaluated 285 eligible studies, encompassing 53,533 patients, in their systematic review and meta-analysis. Their findings from controlled, randomized, double-blind clinical trials did not support an association between beta-blocker usage and depression. Apart from sleep-related disorders, beta-blockers were not found to have any effects on other psychiatric side effects. They concluded that beta-blocker-related psychological changes should not deter their use in clinical practice. Similarly, Andrade et al.[28] emphasized that beta-blockers were associated with an increased risk of tiredness, sleep disorders, and fatigue compared to placebo. These findings suggest that symptoms such as tiredness, fatigue, and sleep disorders may be misinterpreted as depression, which could explain why beta-blockers have been associated with depression. Furthermore, the randomized clinical trials included in the meta-analysis often categorized depression as a symptom rather than a clinical diagnosis. There are some limitations in our study regarding the relationship between depression and beta-blocker usage. Psychological changes associated with acute HF symptoms may be mistaken for signs of depression in hospitalized HF patients. In this study, depressive symptoms were assessed using self-reported questionnaires, but a clinical interview is the gold standard for diagnosing depression. Therefore, the presence of depressive symptoms indicated by a high PHQ-9 score may not definitely confirm a diagnosis of depression. In light of this information, HF patients using beta-blockers should be monitored more closely for depressive symptoms.

BNP is a key biochemical marker used in the diagnosis and management of HF. Most studies have focused on the potential relationship between BNP and depression. Parissis et al.[29] demonstrated significantly higher BNP levels in chronic HF patients with moderately to severely reduced EF who were depressed compared to those who were not. Aguiar et al.[30] evaluated hospitalized advanced HF patients with EF < 40% and found that severely depressed patients had higher BNP levels. Conversely, Thomas Müller-Tasch found no relationship between N-terminal pro-brain natriuretic peptide (NT proBNP) and depression in patients with systolic chronic HF.[31] Similarly, Feola et al.[32] reported no significant relationship between BNP levels and depression in either

cross-sectional or longitudinal analyses in HF patients.[33,34] In our study, lower BNP levels were observed in patients with no depression compared to those with a PHQ-9 score ≥ 5. However, this difference was not statistically significant in the regression analysis. Patients with severe depression exhibit increased neurohormonal stimulation. These neurohormonal changes associated with depression may contribute to elevated BNP levels related to cardiac overload.

Depression is common in patients with DM as well as in those with HF. Both DM and depression increase the risk of HF. Mulugeta et al.[35] demonstrated that diabetic HF patients had a significantly higher prevalence of depression. Similar findings have been observed in other studies.[36,37] Conversely, Hammash et al.[13] did not identify a relationship between DM and depressive symptoms in HF patients. In our study, DM was less frequent in patients with no depression. Although DM was significant in the univariate regression analysis, it did not reach significance in the multivariate regression analysis. DM-related complications, poor glycemic control, nonadherence to treatment, polypharmacy, decline in self-care, and poor overall health status may all contribute to depressive symptoms.

Chronic kidney disease and HF frequently coexist, sharing similar risk factors for their development. Furthermore, both kidney disease and HF can negatively impact each other's prognosis. Depression is also more frequent in patients with chronic kidney disease, as it is in those with HF.[38] Seecheran et al.[39] found a significant relationship between chronic kidney disease and depressive symptoms in patients with cardiovascular diseases. Depression was more frequent in patients with severe chronic kidney disease than in those without it among hospitalized chronic HF patients in the study by Hedayati et al.[40] eGFR levels were higher in patients with no depression compared to those with a PHQ-9 score ≥ 5 in our study. Although higher eGFR levels were significant in univariate regression analysis, they did not reach significance in the multivariate regression analysis. The relationship between the heart and kidney, referred to as cardiorenal syndrome, is closely linked to HF symptoms and the patient's response to treatment. Impaired renal function also negatively impacts cardiac outcomes.

Limitations

First, this study was conducted on a small number of patients at a single center. Second, depressive symptoms were assessed using a self-reported questionnaire rather than clinical interviews. Third, confounding factors such as marital status, social support, income level were not evaluated. Consequently, multi-center studies with larger sample sizes and long-term follow-up are needed to confirm these findings.

Conclusion

In our study, 45.5% of the hospitalized HF patients had no depression. DM and beta-blocker usage were less frequent, NYHA class and BNP levels were lower, and eGFR levels were higher in patients with no depression. Additionally, NYHA class and beta-blocker usage were identified as independent predictors of the absence of depression in hospitalized HF patients. Despite the strong association between depression and HF, depression is often underrecognized and undertreated by physicians. This study highlights the importance of physicians recognizing depression in hospitalized HF patients. Regular depression screening should be integrated into clinical practice.

Ethics Committee Approval: Ethics committee approval was obtained from Non-Invasive Clinical Ethics Committee of Kocaeli University (Approval Number: KÜ GOKAEK 2018/132, Date: 21.03.2018).

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