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## Prevalence of depression and associated factors in patients hospitalized with heart failure

**OBJECTIVE** To estimate the prevalence of depression and to identify associated factors in patients hospitalized with heart failure (HF) using the Patient Health Questionnaire-9 (PHQ-9). **METHOD** The study sample consisted of 152 patients with HF who were hospitalized in the Department of Cardiology of a tertiary hospital in Athens, Greece over a period of one year. Data were collected using a questionnaire consisting of three parts; socio-demographic and clinical characteristics, results of laboratory and diagnostic work-up retrieved from the hospital records, and the PHQ-9 scale. **RESULTS** The prevalence of major depression (PHQ-9 score  $\geq 10$ ) was 34.2%. Among the factors examined, worse overall perceived health (OPH) ( $p < 0.001$ ) and New York Heart Association (NYHA) class ( $p < 0.001$ ) were strongly associated with major depression. Age ( $p = 0.015$ ) was also associated with major depression, with the younger ( $< 60$  years) and the older ( $\geq 80$  years) patients being more depressed. Sleep duration ( $p = 0.028$ ) was associated with major depression, with those sleeping  $< 6$  hours and  $> 8$  hours being more depressed. After stepwise logistic regression, OPH, NYHA class and age remained statistically significantly associated with major depression. **CONCLUSIONS** Measures must be taken to identify, evaluate and manage depression in patients hospitalized with HF, the prevalence of which is particularly high in this population.

Heart failure (HF) affects approximately 6.2 million Americans aged  $\geq 18$  years<sup>1</sup> and 15 million patients in 51 countries represented by the European Society of Cardiology.<sup>2</sup> As the world population ages and survival from cardiovascular disease improves, the overall burden of HF is expected to increase over time. Depression continues to be a major public health problem and the World Health Organization (WHO) forecasts that depression will be the second leading cause of world disability by 2020.<sup>3</sup> Depression in older people in the general hospital is especially prevalent, affecting almost 30%.<sup>4</sup> In Greece, since the beginning of the financial crisis there has been a steep increase in the one-month prevalence of major depression in the general population from 3.3% in 2008 to 12.3% in 2013.<sup>5,6</sup> The prevalence of depressive symptoms in the elderly population in Greece is over 30%.<sup>7</sup> The average prevalence of major depression in patients with HF is estimated at 19.3% when diagnostic interviews are used and 33.6% in the case of questionnaires.<sup>8</sup> Major depression in Greek

patients hospitalized with HF was recently reported to be 24.2%.<sup>9</sup> The purpose of this study was to estimate the prevalence of depression in patients hospitalized with HF using the Patient Health Questionnaire-9 (PHQ-9),<sup>10</sup> which is proposed by the American Heart Association as a screening tool to check for the presence of depression<sup>11</sup> and has been successfully utilized in patients with HF.<sup>12</sup>

### MATERIAL AND METHOD

The study sample consisted of 152 patients with HF who were hospitalized in the Department of Cardiology of a tertiary hospital in Athens, Greece over a period of one year. The study protocol was approved by the hospital ethical committee, and the participants provided their informed consent. The inclusion criteria were a diagnosis of HF, age  $\geq 18$  years, and adequate understanding of the Greek language. Patients were excluded if they were diagnosed with another life-threatening disease (e.g., cancer) or a chronic severe psychiatric condition (e.g., psychosis), had a

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Επιπολασμός κατάθλιψης και σχετιζόμενοι παράγοντες σε νοσηλευόμενους ασθενείς με καρδιακή ανεπάρκεια

Περίληψη στο τέλος του άρθρου

### Key words

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history of alcohol abuse or dependence in the past 6 months, or were receiving antidepressant medication. The study data were collected using a questionnaire consisting of three parts, specifically socio-demographic and clinical characteristics, the results of laboratory and diagnostic work-up, retrieved from the hospital records, and the PHQ-9 scale. Demographic data included gender, age, body mass index (BMI), calculated by using the patients' height and weight), marital status, educational level, employment status, presence or not of health insurance, financial difficulty in buying medication and multiple laboratory values.

The presence of depression was evaluated with the PHQ-9,<sup>10</sup> a self-administered questionnaire for screening, diagnosing, monitoring, and measuring the severity of depression that has been validated for the Greek population.<sup>13</sup> In the current study, the Cronbach alpha value ( $\alpha=0.849$ ) indicated that the collected data had good internal consistency. Based on the PHQ-9 score (0–27 points) individuals were categorized into five predefined categories of severity of depression symptoms: PHQ-9 scores of 5, 10, 15, and 20 represented mild, moderate, moderately severe, and severe depression, respectively. A PHQ-9 score  $\geq 10$  has a sensitivity of 85% and a specificity of 89% for major depression.<sup>14</sup>

### Statistical analysis

Statistical analysis was performed using the Statistical Package for Social Sciences (IBM SPSS for Windows), version 20.0. Descriptive data were presented as frequency, percentage, mean, standard deviation (SD) and range. One-way analysis of variance (ANOVA), Kruskal-Wallis test, t-test for continuous variables and  $\chi^2$  or Fisher exact test for nominal variables were used to compare means between groups as appropriate. Predictors of depression were assessed by performing stepwise logistic regression analysis. A *p* value  $<0.05$  was considered statistically significant.

### Study limitations

The present study was cross-sectional and thus does not allow for inferences or changes over time or determination of a causal relationship between depression and the socio-demographic, clinical and laboratory variables. The study sample was not representative of Greek patients with HF, but was a convenience sample recruited in one hospital. All these factors limit generalization of the findings.

The strengths of the study include the use of a validated and reliable questionnaire (PHQ-9) that is frequently used in medical practice and is validated for use in the Greek population. It is the first study in Greece to gather information on the clinical status and laboratory values in patients with HF, rather than focusing mainly on socio-demographic characteristics.

## RESULTS

Of the 152 patients with HF, 94 (61.8%) were males and

58 (38.2%) females, with an average age of  $70.9 \pm 13.7$  years. Their baseline demographic and clinical characteristics are presented in table 1. Most of them were older than 70 years, retired, married, had two children and were of low educational status (primary education). Most of the patients had disease duration of longer than one year, prior experience of hospitalization for HF, and were well informed regarding their disease. Regarding the ejection fraction (EF), the percentages of patients with reduced, mid-range, and preserved EF were 54.6%, 20.4%, and 25.0%, respectively (tab. 2). The percentages in NYHA classes I, II, III, and IV were 12.5%, 41.4%, 37.5%, and 8.6%, respectively. Most of the patients were overweight and obese, but smoking and regular alcohol consumption were not prevalent (tab. 1). Regarding comorbidities, hypertension, dyslipidemia, coronary heart disease, atrial fibrillation, diabetes mellitus (DM), anemia, thyroid disease, and chronic obstructive pulmonary disease (COPD) were the most common (tab. 2). The majority of the patients were receiving guideline directed therapy for HF (tab. 3). The main laboratory findings on the study patients are presented in table 4.

According to their scores on the PHQ-9 scale, depressive symptoms were reported by 67.8% of the patients, and major depression (PHQ-9 score  $\geq 10$ ) by 34.2% (tab. 1). Among the factors examined, worse overall perceived health (OPH) ( $p < 0.001$ ) and NYHA class ( $p < 0.001$ ) were strongly associated with the presence of major depression (tables 1, 2). Age was associated with major depression, with the younger ( $< 60$  years) and the older ( $\geq 80$  years) patients with HF being more depressed ( $p = 0.015$ ) (tab. 1). Sleep duration also was associated with major depression, with those sleeping  $< 6$  hours and those  $> 8$  hours being more depressed ( $p = 0.028$ ) (tab. 1). Stepwise logistic regression showed that OPH, NYHA class, and age remained statistically significantly associated with major depression (tab. 5).

## DISCUSSION

In this study the prevalence of major depression was 34.2%. The documented aggregated prevalence of depression in patients with HF is about 21% (range 9–60%) and is higher in women than men, with 32.7% (range 11–67%) of women being depressed compared with 26.1% (range 7–63%) of men.<sup>8</sup> Depression rates reported among hospitalized patients are 13–77.5%,<sup>15–18</sup> and rates for outpatients 13–48%.<sup>19–22</sup> A recent study conducted in Greece showed that 24.2% of patients hospitalized with HF suffered from major depression;<sup>9</sup> our study findings suggest that this prevalence has increased over the last five years. The differences in the reported prevalence of depression are related

**Table 1.** Characteristics of patients hospitalized with heart failure (HF) (n=152), according to level of depression (cut-off of 10 on the Patient Health Questionnaire-9 [PHQ-9] scale).

		Values*			p-value
		Total population	Depressed	Non-depressed	
Age (years)	<60	29 (19.1%)	15 (51.7%)	14 (48.3%)	<b>0.015</b>
	60–69	34 (22.4%)	10 (29.4%)	24 (70.6%)	
	70–79	37 (24.3%)	6 (16.2%)	31 (83.8%)	
	>80	52 (34.2%)	21 (40.4%)	31 (59.6%)	
Sex	Male	94 (61.8%)	29 (30.9%)	65 (69.1%)	0.266
	Female	58 (38.2%)	23 (39.7%)	35 (60.3%)	
BMI (kg/m <sup>2</sup> )	15–19.99	7 (4.6%)	3 (42.9%)	4 (57.1%)	0.408
	20–24.99	42 (27.6%)	18 (42.9%)	24 (57.1%)	
	25–29.99	62 (40.8%)	17 (27.4%)	45 (72.6%)	
	30–49.99	41 (27%)	14 (34.1%)	27 (65.9%)	
Professional status	Retired	61 (40.1%)	17 (27.9%)	44 (72.1%)	0.341
	Household	25 (16.4%)	12 (48.0%)	13 (52.0%)	
	Employed	66 (43.5%)	23 (34.8%)	43 (65.2%)	
Marital status	Single/divorced/widowed	65 (42.8%)	24 (36.9%)	41 (63.1%)	0.542
	Married	87 (57.2%)	28 (32.2%)	59 (67.8%)	
Educational level	Primary	74 (48.7%)	27 (36.5%)	47 (63.5%)	0.835
	Secondary	52 (34.2%)	17 (32.7%)	35 (67.3%)	
	University/master/PhD	26 (17.1%)	8 (30.8%)	18 (69.2%)	
Number of children	None	38 (25.0%)	11 (28.9%)	27 (71.1%)	0.461
	One	34 (22.4%)	10 (29.4%)	24 (70.6%)	
	Two or more	80 (52.6%)	31 (38.8%)	49 (61.2%)	
Medical insurance	Yes	142 (93.4%)	47 (33.1%)	95 (66.9%)	0.276
	No	10 (6.6%)	5 (50.0%)	5 (50.0%)	
Years with HF	<1	54 (35.5%)	17 (31.5%)	37 (68.5%)	0.160
	2–5	52 (34.2%)	21 (40.4%)	31 (53.6%)	
	>5	46 (30.3%)	14 (30.4%)	32 (69.6%)	
Prior hospitalization for HF	Yes	78 (51.3%)	26 (33.3%)	52 (66.7%)	0.815
	No	74 (48.7%)	26 (35.1%)	48 (64.9%)	
Total hospitalizations		2,43±2,676	2.62±3.249	2.33±2.336	0.535
Hospitalizations in the last year		1,28±1,182	1.42±1.551	1.21±0.935	0.293
Degree of information	Very much/much	31 (20.4%)	9 (29.0%)	22 (71.0%)	0.667
	Enough	52 (34.2%)	20 (38.5%)	32 (61.5%)	
	Little/not at all	69 (45.4%)	23 (33.3%)	46 (66.7%)	
Health status	Bad/very bad	53 (34.9%)	32 (60.4%)	21 (39.6%)	<b>&lt;0.001</b>
	Average	65 (42.8%)	16 (24.6%)	49 (75.4%)	
	Good/very good/excellent	34 (22.4%)	4 (11.8%)	30 (88.2%)	
Hours of sleep per day	<6	54 (35.5%)	25 (46.3%)	29 (53.7%)	<b>0.028</b>
	6–8	84 (55.3%)	21 (25.0%)	63 (75.0%)	
	>8	14 (9.2%)	6 (42.9%)	8 (57.1%)	
Smoking	No	127 (83.6%)	42 (33.1%)	85 (66.9%)	0.504
	Yes	25 (16.4%)	10 (40.0%)	15 (60.0%)	
Alcohol consumption	No	113 (74.3%)	38 (33.6%)	75 (66.4%)	0.797
	Yes	39 (25.7%)	14 (35.9%)	25 (64.1%)	
Depression**	No	49 (32.2%)			
	Mild	51 (33.6%)			
	Moderate	48 (31.6%)			
	Moderately severe	0 (0.0%)			
	Severe	4 (2.6%)			

\* Values are mean±SD (standard deviation) for continuous variables, and n (%) for categorical variables. One-way analysis of variance (ANOVA), Kruskal-Wallis test, t-test for continuous variables and  $\chi^2$  or Fisher exact test for nominal variables were used to compare means between groups as appropriate

\*\* Scores of 5, 10, 15, and 20 on the PHQ-9 scale represent cut points for mild, moderate, moderately severe, and severe depression, respectively  
BMI: Body mass index

**Table 2.** Clinical characteristics of patients hospitalized with heart failure (HF) (n=152), according to level of depression (cut-off of 10 on the Patient Health Questionnaire-9 [PHQ-9] scale).

		Values*			p-value
		Total population	Depressed	Non-depressed	
NYHA stage	I	19 (12.5%)	2 (10.5%)	17 (89.5%)	<0.001
	II	63 (41.4%)	17 (27.0%)	46 (73.0%)	
	III	57 (37.5%)	22 (38.6%)	35 (61.4%)	
	IV	13 (8.6%)	11 (84.6%)	2 (15.4%)	
EF (including midrange)	<40	83 (54.6%)	30 (36.1%)	53 (63.9%)	0.776
	40–49	31 (20.4%)	9 (29.0%)	22 (71.0%)	
	≥50	38 (25.0%)	13 (34.2%)	25 (65.8%)	
EF	<40	83 (54.6%)	30 (36.1%)	53 (63.9%)	0.581
	≥40	69 (45.4%)	22 (31.9%)	47 (68.1%)	
Diabetes mellitus	Yes	58 (38.2%)	23 (39.7%)	35 (60.3%)	0.266
	No	94 (61.8%)	29 (30.9%)	65 (69.1%)	
Hypertension	Yes	119 (78.3%)	38 (31.9%)	81 (68.1%)	0.261
	No	33 (21.7%)	14 (42.4%)	19 (57.6%)	
Dyslipidemia	Yes	70 (46.1%)	20 (28.6%)	50 (71.4%)	0.176
	No	82 (53.9%)	32 (39.0%)	50 (61.0%)	
Coronary heart disease	Yes	73 (48.0%)	25 (34.2%)	48 (65.8%)	0.993
	No	79 (52.0%)	27 (34.2%)	52 (65.8%)	
Atrial fibrillation	Yes	70 (46.1%)	23 (32.9%)	47 (67.1%)	0.745
	No	82 (53.9%)	29 (35.4%)	53 (64.6%)	
Valvular heart disease	Yes	62 (40.8%)	21 (33.9%)	41 (66.1%)	0.942
	No	90 (59.2%)	31 (34.4%)	59 (65.6%)	
COPD	Yes	28 (18.4%)	9 (32.1%)	19 (67.9%)	0.798
	No	124 (81.6%)	43 (34.7%)	81 (65.3%)	
Chronic kidney disease	Yes	48 (31.6%)	19 (39.6%)	29 (60.4%)	0.343
	No	104 (68.4%)	33 (31.7%)	71 (68.3%)	
Anemia	Yes	50 (32.9%)	20 (40.0%)	30 (60.0%)	0.292
	No	102 (67.1%)	32 (31.4%)	70 (68.6%)	
Thyroid disease	Yes	132 (86.8%)	44 (33.3%)	88 (66.7%)	0.558
	No	20 (13.2%)	8 (40.0%)	12 (60.0%)	

\* Values are mean±SD (standard deviation) for continuous variables, and n (%) for categorical variables. One-way analysis of variance (ANOVA), Kruskal-Wallis test, t-test for continuous variables and  $\chi^2$  or Fisher exact test for nominal variables were used to compare means between groups as appropriate

NYHA: New York Heart Association severity scale, EF: Ejection fraction, COPD: Chronic obstructive pulmonary disease

to various factors, including the method of assessing depression (questionnaire versus structured interview), the various diagnostic instruments, the definition and classification of depression, the severity of HF, mean patient age, ethnicity and gender, and inpatients versus outpatients.<sup>23</sup> A further contributing factor in Greece might be the prolonged financial crisis.<sup>6</sup>

Depression has been shown to impair patient self-

care of HF<sup>24,25</sup> and diminish the quality of life,<sup>24</sup> and is a strong predictor of short-term decline in health status<sup>26</sup> and repeated hospitalizations;<sup>27,28</sup> it is associated with a higher mortality rate and associated clinical conditions, and a greater demand for health care resources, especially in more severely depressed patients.<sup>8,29</sup> Depression is an independent risk factor for mortality in HF, independent of NYHA class.<sup>30</sup> A large Danish study found depression to be related to all-cause mortality in patients with HFREF but

**Table 3.** Medication use in patients hospitalized with heart failure (HF) (n=152), according to level of depression (cut-off of 10 on the Patient Health Questionnaire-9 [PHQ-9] scale).

		Values <sup>a</sup>			p-value
		Total population	Depressed	Non-depressed	
ARBs	Yes	52 (34.2%)	20 (38.5%)	32 (61.5%)	0.426
	No	100 (65.8%)	32 (32.0%)	68 (68.0%)	
ACEIs	Yes	33 (21.7%)	10 (30.3%)	23 (69.7%)	0.593
	No	119 (78.3%)	42 (35.3%)	77 (64.7%)	
MRAs	Yes	89 (58.6%)	28 (31.5%)	61 (68.5%)	0.396
	No	63 (41.4%)	24 (38.1%)	39 (61.9%)	
$\beta$ -blockers	Yes	130 (85.5%)	42 (32.3%)	88 (67.7%)	0.229
	No	22 (14.5%)	10 (45.5%)	12 (54.5%)	
Diuretics	Yes	128 (84.2%)	47 (36.7%)	81 (63.3%)	0.132
	No	24 (15.8%)	5 (20.8%)	19 (79.2%)	
CCBs	Yes	33 (21.7%)	11 (33.3%)	22 (66.7%)	0.904
	No	119 (78.3%)	41 (34.5%)	78 (65.5%)	
Nitrates	Yes	16 (10.5%)	6 (37.5%)	10 (62.5%)	0.769
	No	136 (89.5%)	46 (33.8%)	90 (66.2%)	
Aspirin	Yes	62 (40.8%)	21 (33.9%)	41 (66.1%)	0.942
	No	90 (59.2%)	31 (34.4%)	59 (65.6%)	
Newer antiplatelets	Yes	27 (17.8%)	10 (37.0%)	17 (63.0%)	0.733
	No	125 (82.2%)	42 (33.6%)	83 (66.4%)	
Acenocumarol	Yes	37 (24.3%)	11 (29.7%)	26 (70.3%)	0.509
	No	115 (75.7%)	41 (35.7%)	74 (64.3%)	
NOACs	Yes	26 (17.1%)	7 (26.9%)	19 (73.1%)	0.390
	No	126 (82.9%)	45 (35.7%)	81 (64.3%)	
Statins	Yes	57 (37.5%)	15 (26.3%)	42 (73.7%)	0.112
	No	95 (62.5%)	37 (38.9%)	58 (61.1%)	

<sup>a</sup> Values are mean $\pm$ SD (standard deviation) for continuous variables, and n (%) for categorical variables. One-way analysis of variance (ANOVA), Kruskal-Wallis test, t-test for continuous variables and  $\chi^2$  or Fisher exact test for nominal variables were used to compare means between groups as appropriate

ARBs: Angiotensin receptor blockers, ACEIs: Angiotensin converting enzyme inhibitors, MRAs: Mineralocorticoid receptor antagonists, CCBs: Calcium channel blockers, NOACs: Novel oral anticoagulants

not in other types of HF.<sup>31</sup> A recent meta-analysis showed that major depression, but not mild depression, after HF was a predictor for subsequent all-cause mortality.<sup>32</sup> The increased mortality related to depression in HF persists for more than a decade.<sup>33</sup> Although no one questions the importance of depression on patients with HF, there is still considerable debate on the best way to treat it.<sup>23</sup> There is substantial proof that the use of selective serotonin reuptake inhibitors (SSRIs) improves depressive symptoms,<sup>23</sup> however two large clinical trials, the SADHART<sup>34</sup> and the MOOD-HF,<sup>35</sup> failed to show any significant benefit over placebo.

Among the factors examined in this study, OPH was associated with a higher probability of major depression. OPH

is lower in patients with HF than in the general population and patients with other chronic diseases.<sup>36,37</sup> In patients with HF, OPH has been demonstrated to be a powerful predictor of hospitalization and mortality even after controlling for a multitude of other factors.<sup>38,39</sup> In patients with HF, health status is associated with depressive symptoms and it also predicts their onset.<sup>40,41</sup>

Worse NYHA class was also associated with a higher probability of major depression in this study. A systematic review has demonstrated that higher depression prevalence was associated with worse NYHA class.<sup>8</sup> It has been shown that hospitalized patients with NYHA class IV HF had significantly more depressive symptoms than patients with NYHA

**Table 4.** Laboratory values of patients hospitalized with heart failure (HF) (n=152), according to level of depression (cut-off of 10 on the Patient Health Questionnaire-9 [PHQ-9] scale).

	Values*			p-value
	Total population	Depressed	Non-depressed	
HbG (g/dL)	12.54±2.09	12.36±2.07	12.62±2.11	0.461
HbA <sub>1c</sub> (%)	6.37±1.20	6.39±1.35	6.37±1.13	0.906
Urea (mg/dL)	71.48±44.06	80.10±56.69	67.00±35.30	0.133
Creatinine (mg/dL)	1.40±0.70	1.41±0.71	1.40±0.69	0.983
GFR (mL/min/1.73 m <sup>2</sup> )	61.63±33.42	63.70±38.43	60.56±30.65	0.611
Urate (mg/dL)	7.42±2.35	7.46±2.57	7.40±2.24	0.875
Total cholesterol (mg/dL)	159.44±47.78	153.42±48.30	162.57±47.45	0.264
Fe (µg/dL)	57.77±37.82	60.25±41.04	56.48±36.18	0.562
Ferritine (ng/mL)	166.62±251.33	234.70±397.67	131.22±105.73	0.071
Vitamin B12 (pg/mL)	536.54±602.37	519.37±406.61	545.47±684.12	0.801
Folate (ng/mL)	7.18±6.45	6.31±4.18	7.63±7.34	0.235
TSH (µU/mL)	1.58±0.98	1.54±0.93	1.61±1.00	0.674

\* Values are mean±SD (standard deviation) for continuous variables, and n (%) for categorical variables. One-way analysis of variance (ANOVA), Kruskal-Wallis test, t-test for continuous variables and  $\chi^2$  or Fisher exact test for nominal variables were used to compare means between groups as appropriate

HbG: Hemoglobin, HbA<sub>1c</sub>: Glycosylated hemoglobin A1C, GFR: Glomerular filtration rate, Fe: Iron, TSH: Thyroid stimulating hormone

**Table 5.** Association between socio-demographic and clinical characteristics of patients with heart failure and depression (binomial logistic regression analysis).

Variable	B	Odds ratio	p-value
<i>NYHA</i>			
NYHA I	-3.324	0.036	0.003
NYHA II	-2.060	0.127	0.017
NYHA III	-1.961	0.141	0.021
<i>Health status</i>			
Bad/very bad	2.257	9.555	0.001
Average	0.913	2.492	0.171
<i>Age</i>			
<60	0.392	1.481	0.478
60–69	-0.481	0.618	0.383
70–79	-1.430	0.239	0.018

NYHA: New York Heart Association severity scale

Notes: The coefficients for NYHA groups are contrasts with the minority NYHA IV group

The Health status coefficients are contrasts with the minority good/very good/excellent group. The age coefficients are contrasts with the majority >80 years group

class II or III<sup>42</sup> and outpatients classified as NYHA class III and IV are more likely to be depressed than class II patients.<sup>22</sup>

Age was also associated with major depression, with the younger (<60 years) and the older (≥80 years) patients with HF being more depressed. Relevant research has also

shown that depression was seen more commonly among younger than older patients.<sup>22</sup> The higher incidence of depression in the young could be because there is a larger discrepancy between the perception of functional status and the expectation and the fact that coping with the limitations caused by HF may be more difficult for younger individuals to accept.<sup>22</sup> Polikandrioti and colleagues have observed a similar U-curved, though not statistically significant, relationship between age and major depression in patients hospitalized with HF.<sup>9</sup>

Short and long habitual sleep duration both show association with an increased risk of all-cause mortality.<sup>43</sup> In a representative sample of US adults shorter and longer sleep durations were an important marker of coronary vascular disease (CVD).<sup>44</sup> A recent meta-analysis showed that short and long sleep duration was significantly associated with increased risk of depression in adults.<sup>45</sup> In our study, sleep duration was likewise associated (p=0.028) with major depression, with those sleeping <6 hours and those >8 hours being more depressed.

In conclusion, the Greek medical community must take measures to identify, evaluate, and manage depression in patients hospitalized with HF, the prevalence of which is particularly high in this population. It is suggested that the period during hospitalization is the best for diagnosis of depression, because there is the opportunity for early diagnosis and treatment, and it is the time when the pa-

tients are under effective management.<sup>46</sup> If we could make the diagnosis of depression during their hospitalization by asking our patients a few simple questions we would have

the opportunity to improve their quality of life;<sup>47</sup> it is time we realized how important this is in their management and prognosis.

## ΠΕΡΙΛΗΨΗ

### Επιπολασμός κατάθλιψης και σχετιζόμενοι παράγοντες σε νοσηλευόμενους ασθενείς με καρδιακή ανεπάρκεια

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**ΣΚΟΠΟΣ** Εκτίμηση του επιπολασμού της κατάθλιψης και καταγραφή των σχετιζόμενων με αυτή παραγόντων σε νοσηλευόμενους ασθενείς με καρδιακή ανεπάρκεια (ΚΑ) χρησιμοποιώντας το ερωτηματολόγιο υγείας ασθενών-9 (PHQ-9). **ΥΛΙΚΟ-ΜΕΘΟΔΟΣ** Το δείγμα μελέτης περιλάμβανε 152 ασθενείς με ΚΑ που νοσηλεύτηκαν στην καρδιολογική κλινική ενός τριτοβάθμιου νοσοκομείου στην Αθήνα, σε διάστημα ενός έτους. Η συλλογή δεδομένων πραγματοποιήθηκε χρησιμοποιώντας ένα ερωτηματολόγιο που αποτελείται από τρία μέρη: τα κοινωνικο-δημογραφικά και κλινικά χαρακτηριστικά, τα αποτελέσματα εργαστηριακών και διαγνωστικών εξετάσεων και την κλίμακα PHQ-9. **ΑΠΟΤΕΛΕΣΜΑΤΑ** Ο επιπολασμός μείζονος κατάθλιψης (PHQ-9 score  $\geq 10$ ) ήταν 34,2%. Μεταξύ των εξετασθέντων παραγόντων, η χειρότερη γενική κατάσταση υγείας ( $p < 0,001$ ) και η κλάση κατά NYHA ( $p < 0,001$ ) συσχετίστηκαν με την παρουσία μείζονος κατάθλιψης. Η ηλικία ( $p = 0,015$ ) συσχετίστηκε επίσης με μείζονα κατάθλιψη, ενώ οι νεότεροι (ηλικίας  $< 60$  ετών) αλλά και οι πιο ηλικιωμένοι ( $\geq 80$  ετών) ασθενείς παρουσίαζαν σοβαρότερου βαθμού καταθλιπτικά συμπτώματα. Η διάρκεια ύπνου ( $p = 0,028$ ) παρομοίως συσχετίστηκε με παρουσία μείζονος κατάθλιψης, με τους ασθενείς που κοιμούνταν  $< 6$  ώρες και  $> 8$  ώρες να εμφανίζουν σοβαρότερα καταθλιπτικά συμπτώματα. Το στατιστικό μοντέλο γραμμικής παλινδρόμησης που εφαρμόστηκε ανέδειξε ότι η χειρότερη γενική κατάσταση υγείας, η κλάση κατά NYHA και η ηλικία είχαν στατιστικά σημαντική συσχέτιση με την παρουσία μείζονος κατάθλιψης. **ΣΥΜΠΕΡΑΣΜΑΤΑ** Η ελληνική ιατρική κοινότητα πρέπει να λάβει μέτρα για τον εντοπισμό, την αξιολόγηση και τη διαχείριση της κατάθλιψης σε νοσηλευόμενους ασθενείς με ΚΑ, ο επιπολασμός της οποίας είναι ιδιαίτερα υψηλός σε αυτόν τον πληθυσμό.

**Λέξεις ευρητηρίου:** Καρδιακή ανεπάρκεια, Κατάθλιψη, Νοσηλευόμενοι ασθενείς, PHQ-9

## References

- HEIDENREICH PA, ALBERT NM, ALLEN LA, BLUEMKE DA, BUTLER J, FONAROW GC ET AL. Forecasting the impact of heart failure in the United States: A policy statement from the American Heart Association. *Circ Heart Fail* 2013, 6:606–619
- PONIKOWSKI P, VOORS AA, ANKER SD, BUENO H, CLELAND JGF, COATS AJS ET AL. 2016 ESC guidelines for the diagnosis and treatment of acute and chronic heart failure: The Task Force for the diagnosis and treatment of acute and chronic heart failure of the European Society of Cardiology (ESC). Developed with the special contribution of the Heart Failure Association (HFA) of the ESC. *Eur Heart J* 2016, 37:2129–2200
- AKENA D, JOSKA J, OBUKU EA, AMOS T, MUSISI S, STEIN DJ. Comparing the accuracy of brief versus long depression screening instruments which have been validated in low and middle income countries: A systematic review. *BMC Psychiatry* 2012, 12:187
- DENNIS M, KADRI A, COFFEY J. Depression in older people in the general hospital: A systematic review of screening instruments. *Age Ageing* 2012, 41:148–154
- MADIANOS M, ECONOMOU M, ALEXIOU T, STEFANIS C. Depression and economic hardship across Greece in 2008 and 2009: Two cross-sectional surveys nationwide. *Soc Psychiatry Psychiatr Epidemiol* 2011, 46:943–952
- ECONOMOU M, MADIANOS M, PEPOU LE, PATELAKIS A, STEFANIS CN. Major depression in the era of economic crisis: A replication of a cross-sectional study across Greece. *J Affect Disord* 2013, 145:308–314
- ARGYROPOULOS K, PANTELI G, CHARALAMBOUS G, ARGYROPOULOU A, GOURZIS P, JELASTOPULU E. Depressive symptoms in older people in Greece and Cyprus. *Eur Psychiatry* 2016, 33:5468
- RUTLEDGE T, REIS VA, LINKE SE, GREENBERG BH, MILLS PJ. Depression in heart failure: A meta-analytic review of prevalence, in-

- tervention effects, and associations with clinical outcomes. *J Am Coll Cardiol* 2006, 48:1527–1537
9. POLIKANDRIOTI M, GOUDEVENOS J, MICHALIS LK, KOUTELEKOS J, KYRISTI H, TZIALAS D ET AL. Factors associated with depression and anxiety of hospitalized patients with heart failure. *Hellen J Cardiol* 2015, 56:26–35
  10. KROENKE K, SPITZER RL, WILLIAMS JB. The PHQ-9: Validity of a brief depression severity measure. *J Gen Intern Med* 2001, 16:606–613
  11. LICHTMAN JH, BIGGER JT Jr, BLUMENTHAL JA, FRASURE-SMITH N, KAUFMANN PG, LESPÉRANCE F ET AL. Depression and coronary heart disease: recommendations for screening, referral, and treatment: a science advisory from the American Heart Association Prevention Committee of the Council on Cardiovascular Nursing, Council on Clinical Cardiology, Council on Epidemiology and Prevention, and Interdisciplinary Council on Quality of Care and Outcomes Research: endorsed by the American Psychiatric Association. *Circulation* 2008, 118:1768–1775
  12. BHATT KN, KALOGEROPOULOS AP, DUNBAR SB, BUTLER J, GEORGIOPOULOU VV. Depression in heart failure: Can PHQ-9 help? *Int J Cardiol* 2016, 221:246–250
  13. HYPHANTIS T, KOTSIS K, VOULGARI PV, TSIFETAKI N, CREED F, DROSOS AA. Diagnostic accuracy, internal consistency, and convergent validity of the Greek version of the patient health questionnaire 9 in diagnosing depression in rheumatologic disorders. *Arthritis Care Res (Hoboken)* 2011, 63:1313–1321
  14. MANEA L, GILBODY S, McMILLAN D. Optimal cut-off score for diagnosing depression with the Patient Health Questionnaire (PHQ-9): A meta-analysis. *CMAJ* 2012, 184:E191–E196
  15. FRIEDMAN MM, GRIFFIN JA. Relationship of physical symptoms and physical functioning to depression in patients with heart failure. *Heart Lung* 2001, 30:98–104
  16. VACCARINO V, KASL SV, ABRAMSON J, KRUMHOLZ HM. Depressive symptoms and risk of functional decline and death in patients with heart failure. *J Am Coll Cardiol* 2001, 38:199–205
  17. JIANG W, ALEXANDER J, CHRISTOPHER E, KUCHIBHATLA M, GAULDEN LH, CUFFE MS ET AL. Relationship of depression to increased risk of mortality and rehospitalization in patients with congestive heart failure. *Arch Intern Med* 2001, 161:1849–1856
  18. FREEDLAND KE, RICH MW, SKALA JA, CARNEY RM, DÁVILA-ROMÁN VG, JAFFE AS. Prevalence of depression in hospitalized patients with congestive heart failure. *Psychosom Med* 2003, 65:119–128
  19. HAVRANEK EP, WARE MG, LOWES BD. Prevalence of depression in congestive heart failure. *Am J Cardiol* 1999, 84:348–350
  20. SKOTZKO CE, KRICHTEN C, ZIETOWSKI G, ALVES L, FREUDENBERGER R, ROBINSON S ET AL. Depression is common and precludes accurate assessment of functional status in elderly patients with congestive heart failure. *J Card Fail* 2000, 6:300–305
  21. MURBERG TA, BRU E. Social relationships and mortality in patients with congestive heart failure. *J Psychosom Res* 2001, 51:521–527
  22. GOTTLIEB SS, KHATTA M, FRIEDMANN E, EINBINDER L, KATZEN S, BAKER B ET AL. The influence of age, gender, and race on the prevalence of depression in heart failure patients. *J Am Coll Cardiol* 2004, 43:1542–1549
  23. MBAKWEM A, AINA F, AMADI C. Expert opinion – Depression in patients with heart failure: Is enough being done? *Card Fail Rev* 2016, 2:110–112
  24. RUSTAD JK, STERN TA, HEBERT KA, MUSSELMAN DL. Diagnosis and treatment of depression in patients with congestive heart failure: A review of the literature. *Prim Care Companion CNS Disord* 2013, 15: pii:PCC.13r01511
  25. DiMATTEO MR, LEPPER HS, CROGHAN TW. Depression is a risk factor for noncompliance with medical treatment: Meta-analysis of the effects of anxiety and depression on patient adherence. *Arch Intern Med* 2000, 160:2101–2107
  26. RUMSFELD JS, HAVRANEK E, MASOUDI FA, PETERSON ED, JONES P, TOOLEY JF ET AL. Depressive symptoms are the strongest predictors of short-term declines in health status in patients with heart failure. *J Am Coll Cardiol* 2003, 42:1811–1817
  27. JOHNSON TJ, BASU S, PISANI BA, AVERY EF, MENDEZ JC, CALVIN JE Jr ET AL. Depression predicts repeated heart failure hospitalizations. *J Card Fail* 2012, 18:246–252
  28. FREEDLAND KE, CARNEY RM, RICH MW, STEINMEYER BC, SKALA JA, DÁVILA-ROMÁN VG. Depression and multiple rehospitalizations in patients with heart failure. *Clin Cardiol* 2016, 39:257–262
  29. MORASKA AR, CHAMBERLAIN AM, SHAH ND, VICKERS KS, RUMMANS TA, DUNLAY SM ET AL. Depression, healthcare utilization, and death in heart failure: A community study. *Circ Heart Fail* 2013, 6:387–394
  30. JÜNGER J, SCHELLBERG D, MÜLLER-TASCH T, RAUPP G, ZUGCK C, HAUNSTETTER A ET AL. Depression increasingly predicts mortality in the course of congestive heart failure. *Eur J Heart Fail* 2005, 7:261–267
  31. ADELBOG K, SCHMIDT M, SUNDBØLL J, PEDERSEN L, VIDEBECH P, BØTKER HE ET AL. Mortality risk among heart failure patients with depression: A nationwide population-based cohort study. *J Am Heart Assoc* 2016, 5:e004137
  32. FAN H, YU W, ZHANG Q, CAO H, LI J, WANG J ET AL. Depression after heart failure and risk of cardiovascular and all-cause mortality: A meta-analysis. *Prev Med* 2014, 63:36–42
  33. ADAMS J, KUCHIBHATLA M, CHRISTOPHER EJ, ALEXANDER JD, CLARY GL, CUFFE MS ET AL. Association of depression and survival in patients with chronic heart failure over 12 years. *Psychosomatics* 2012, 53:339–346
  34. O'CONNOR CM, JIANG W, KUCHIBHATLA M, SILVA SG, CUFFE MS, CALLWOOD DD ET AL. Safety and efficacy of sertraline for depression in patients with heart failure: Results of the SAD-HART-CHF (Sertraline Against Depression And Heart Disease in Chronic Heart Failure) trial. *J Am Coll Cardiol* 2010, 56:692–699
  35. ANGERMANN CE, GELBRICH G, STÖRK S, GUNOLD H, EDELMANN F, WACHTER R ET AL. Effect of escitalopram on all-cause mortality and hospitalization in patients with heart failure and depression: The MOOD-HF randomized clinical trial. *JAMA* 2016, 315:2683–2693
  36. HEO S, MOSER DK, LENNIETA, ZAMBROSKI CH, CHUNG ML. A comparison of health-related quality of life between older adults with heart failure and healthy older adults. *Heart Lung* 2007, 36:16–24

37. RIEDINGER MS, DRACUP KA, BRECHT ML; SOLVD INVESTIGATORS. STUDIES OF LEFT VENTRICULAR DYSFUNCTION. Quality of life in women with heart failure, normative groups, and patients with other chronic conditions. *Am J Crit Care* 2002, 11:211–219
38. HAVRANEK EP, LAPUERTA P, SIMON TA, L'ITALIEN G, BLOCK AJ, ROULEAU JL. A health perception score predicts cardiac events in patients with heart failure: Results from the IMPRESS trial. *J Card Fail* 2001, 7:153–157
39. KONSTAM V, SALEM D, POULEUR H, KOSTIS J, GORKIN L, SHUMAKER S ET AL. Baseline quality of life as a predictor of mortality and hospitalization in 5,025 patients with congestive heart failure. SOLVD investigations. Studies of Left Ventricular Dysfunction investigators. *Am J Cardiol* 1996, 78:890–895
40. HAVRANEK EP, SPERTUS JA, MASOUDI FA, JONES PG, RUMSFELD JS. Predictors of the onset of depressive symptoms in patients with heart failure. *J Am Coll Cardiol* 2004, 44:2333–2338
41. EASTWOOD JA, MOSER DK, RIEGEL BJ, ALBERT NM, PRESSLER S, CHUNG ML ET AL. Commonalities and differences in correlates of depressive symptoms in men and women with heart failure. *Eur J Cardiovasc Nurs* 2012, 11:356–365
42. PENA FM, DA SILVA SOARES J, PAIVA BT, PIRACIABA MC, MARINS RM, BARCELLOS AF ET AL. Sociodemographic factors and depressive symptoms in hospitalized patients with heart failure. *Exp Clin Cardiol* 2010, 15:e29–e32
43. CAPPUCCIO FP, D'ELIA L, STRAZZULLO P, MILLER MA. Sleep duration and all-cause mortality: A systematic review and meta-analysis of prospective studies. *Sleep* 2010, 33:585–592
44. SABANAYAGAM C, SHANKAR A. Sleep duration and cardiovascular disease: Results from the National Health Interview Survey. *Sleep* 2010, 33:1037–1042
45. ZHAI L, ZHANG H, ZHANG D. Sleep duration and depression among adults: A meta-analysis of prospective studies. *Depress Anxiety* 2015, 32:664–670
46. AMIN AA, JONES AM, NUGENT K, RUMSFELD JS, SPERTUS JA. The prevalence of unrecognized depression in patients with acute coronary syndrome. *Am Heart J* 2006, 152:928–934
47. ROLLMAN BL, HERBECK BELNAP B, MAZUMDAR S, HOUCK PR, HE F, ALVAREZ RJ ET AL. A positive 2-item Patient Health Questionnaire depression screen among hospitalized heart failure patients is associated with elevated 12-month mortality. *J Card Fail* 2012, 18:238–245

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