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Depression in patients with chronic heart failure: Correlation with hemodynamic parameters and lipids' metabolism

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Abstract

Depression is a major issue in chronic heart failure (CHF). The purpose of study was evaluation of correlations between depression and main hemodynamic and lipids' metabolism parameters in patients with chronic heart failure. 80 patients with CHF II-III NYHA classes caused by chronic coronary artery diseases (CAD) were observed. Patients with chronic heart failure and depression have more strong central hemodynamic and lipid metabolism disorders versus without depression.

Keywords: depression, chronic heart failure, central hemodynamics, lipids

Introduction

Depression is a major issue in chronic heart failure (CHF) and its prevalence is about 20–40 %, which is 4–5 % higher than in the normal population [1, 2]. The prevalence of depression increases with New York Heart Association (NYHA) functional class, with the biggest difference seen between NYHA classes II and III [1].

Many studies have suggested a worse outcome in CHF patients with depression across a broad range of events including mortality, healthcare use and associated clinical conditions. Depression was found to be an independent risk factor for mortality in CHF, and this persists independent of NYHA class [3]. A meta-analysis of nine studies shows that the relationship between depression and mortality is dependent on the severity of depression: severe and not mild depression are associated with increased mortality [4]. Moreover, it has also been shown to be the strongest predictor of short-term declines in health status, significant worsening of CHF symptoms, physical and social functions, and quality of life [5].

The purpose of study was evaluation of correlations between depression and main hemodynamic and lipids' metabolism parameters in patients with chronic heart failure.

Material and Methods

80 patients with CHF II-III NYHA classes caused by chronic coronary artery diseases (CAD) were observed. All patients were divided into two groups: 1 – 20 persons without signs of depression and 2 – 60 persons with depression. Diagnosis of CHF was confirmed based on ESC guidelines (2016). Depression was diagnosed by some questionnaires (Zung Self-Rating Depression Scale, Beck Depression Inventory, Hamilton's Depression Scale).

We used some instrumental and laboratory tests: office blood pressure (systolic (SBP) and diastolic (DBP)) measurement, lipids' level in blood plasma measurement. Echocardiography (EchoCG) was performed at baseline and within 6 months. All measurements were made according to the recommendations of the American Society of Echocardiography and the European Association of Echocardiography [6].

The study was performed in accordance with the Helsinki Declaration and Good Clinical Practice Guideline. The study was approved by the local ethics committee and written informed consent was obtained from all patients. Categorical variables are presented as percentages, whereas continuous variables are presented as mean (M) and standard error of mean (m) if normally distributed, or as median and interquartile range (Me [IQR]), if not. Categorical variables were compared by the χ^2 test and continuous variables by the t test or the Mann-Whitney U test. A p value of <0.05 was considered statistically significant. All tests were 2-sided. Analyses were performed with Statistica system software, version 12.0.

Results and Discussion

Using Hamilton's Depression Scale, it was established that mild depressive disorders are

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mostly observed in patients with CHF - 71.6% of patients. However, the average expression of depression was observed in 23.4% of patients studied, severe one – in 3.3%, and extreme hard depression - in 1.7% of cases. It was reported about the reciprocal medium strength relationship between the severity of depression and the level of blood pressure: both systolic (SBP): $r = -0.30$ and diastolic (DBP): $r = -0.35$. The findings are consonant with the 22-year study HUNT (Nord-Trøndelag Health Study), which itself involved approximately 17,500 individuals, that demonstrated dependence of anxiety and depression with the low SBP (-0.67 mm Hg, $p = 0.044$) and DBP (-0.25 mmHg, $p = 0.201$) [7]. However, this association is independent of age, gender, concomitant cardiovascular diseases and drugs, which were used. There are direct correlation bonds of medium strength between the content of TG in blood plasma and the manifestation of depressive disorders in patients with CHF ($r = 0.7$; $p < 0.05$). Numerous clinical studies confirm the link between high TG plasma levels and expression of depressive symptoms [8]. There was also determined the direct correlative bonds of medium strength between the expressions of depression and the indicators of central hemodynamics according to echocardiography: left atrium (LA) diameter ($r = 0.57$; $p < 0.05$), end-diastolic size (EDS) ($r = 0.53$; $p < 0.05$), end-systolic size (ESS) ($r = 0.58$; $p < 0.05$), end-diastolic volume (EDV) ($r = 0.44$; $p < 0.05$), end-systolic volume (ESV) ($r = 0.47$; $p < 0.05$). There was found a weak inverse correlation between left ventricular ejection fraction (EF) and the expressiveness of depressive disorders in patients with ischemic CHF ($r = -0.29$; $p < 0.05$). According to the Spielberger-Khanin questionnaire, it was found that in the majority of surveyed patients with CHF, a high degree of situational anxiety was seen in 71.7% of individuals, and the average expression of this trait was observed in 28.3% of people. Similarly, surveyed patients with CHF were divided according to the degree of personality anxiety: the lowest - in 5% of individuals, the average - in 38.3% and the highest - in 56.7% of people. It is worth to note, that the patients, diagnosed with ischemic heart failure and comorbid depression had more expressed situational anxiety - in 61.7% of cases than personal one. In conducting correlation analysis there was noted a direct correlation between anxiety and situational content of serum urea ($r = 0.42$; $p < 0.05$) - medium strength and content of creatinine ($r = 0.29$; $p < 0.05$) - weak strength. There is a strong inverse relationship between the level of total cholesterol in the blood plasma of patients with CHF and expression of situational anxiety ($r = -0.97$; $p < 0.05$). And the relationship between this feature and the content of TG is direct ($r = 0.91$; $p < 0.05$). The average correlation between the manifestation of situational anxiety and the indicators of echocardiography was observed: EDS ($r = 0.52$; $p < 0.05$); ESS ($r = 0.52$; $p < 0.05$); EDV ($r = 0.51$; $p < 0.05$), ESV ($r = 0.50$, $p < 0.05$). There is an inverse medium relationship between the ejection of the left ventricle and situational anxiety ($r = -0.41$; $p < 0.05$). There was a strong direct correlation between the expressiveness of manifestations of depression and situational anxiety ($r = 0.72$; $p < 0.05$). According to a study conducted at Duke University Medical Center (USA), anxiety in patients with CHF doubles the risk of overall mortality, and its combination with depression – makes it three times more severe [9]. There was also observed a weak direct relationship between the expression of personal anxiety and contents of serum glucose in patients with heart failure ($r = 0.28$; $p < 0.05$). A strong

inverse correlation was observed between personal anxiety and serum iron levels in the blood plasma of the examined patients ($r = -0.77$; $p < 0.05$) and the level of LDL cholesterol ($r = -0.91$; $p < 0.05$). There was marked the direct medium strength correlation between expressive manifestations of depression and personal anxiety ($r = 0.38$; $p < 0.05$).

Conclusion

Patients with chronic heart failure and depression have more strong central hemodynamic and lipid metabolism disorders versus without depression.

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