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ANXIETY SYNDROME IN PATIENTS WITH ARTERIAL HYPERTENSION AND OBESITY AND ITS EFFECT ON CARDIOVASCULAR RISK FACTORSS

Abstract

The objective of the study: To reveal the prevalence of anxiety syndrome in young men (working age) with hypertension, to compare its frequency depending on the presence and absence of obesity (OB), and also to trace its correlation with the Echo-signs of left ventricular remodeling and with eating behavior pattern. **Materials and methods.** 80 patients with hypertension were included in the study. The reasons for hospitalization were the deterioration of the disease course and the routine examination. Depending on body mass index, all patients were divided into 2 groups: 1- patients with obesity, and 2 — the control group. All patients filled out the questionnaires to determine trait and state anxiety, and various types of eating disorders. **Results and discussion.** During the study, it was found out that obesity in patients with hypertension is associated with such pathological mechanisms as anxiety, which in turn leads to the progression of myocardial pathology, in particular ventricular remodeling. It is significant that the anxiety syndrome in patients with obesity is directly associated with restrained and external types of eating disorders. **Conclusion.** Timely detection of a high level of anxiety, as well as abnormalities in eating behavior in patients with obesity offers the opportunity to optimize medical treatment by using psychocorrective methods.

Key words: *hypertension, obesity, anxiety, eating disorders*

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LVH — left ventricular hypertrophy, BMI — body mass index, BP — blood pressure, TA — trait anxiety, HC — hip circumference, OB — obesity, WC — waist circumference, ABPM — 24-hour ambulatory blood pressure monitoring, CVD — cardiovascular diseases, SA — state anxiety, Echo — echocardiography

Introduction

In cases of hypertension, the patients' prognosis is mostly determined by the condition of the target organs, and in the first place by the presence and severity of ventricular hypertrophy that is assessed as a manifestation of hypertensive cardiomegaly [1]. Hypertension is known to be the cause of atrial fibrillation and chronic heart failure, which is a syndrome of poor prognosis. Hypertension leads to left ventricular hypertrophy in 80 % of cases, which significantly affects the quality of patient's life [2]. It has also been established that hypertension often occurs together with obesity, mainly abdominal obesity. The hypothesis that there is a relationship between excess fat and cardiovascular diseases (CVD) was proposed more than 50 years ago. The well-known clinical physician

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E. M. Tareev wrote in 1948: "The portrait of a patient with hypertension is most frequently associated with an obese hypersthenic and with possible protein metabolism disorders and accumulation of incomplete metamorphosis products in the blood such as cholesterol, uric acid..." [3]. At the same time, the importance of psycho-emotional aspects as an independent risk factor for the development and progression of cardiovascular disease has been increasingly discussed recently. The most significant of these are: depression, anxiety, individual personality traits, social isolation, and stress. Currently, a large amount of data has been accumulated, indicating that anxiety increases the hypertension and coronary artery disease incidence and mortality rates, and it also complicates the course and worsens the prognosis of these diseases [4, 5, 6, 7, 8, 9].

The significance of anxiety disorder in cardiology was confirmed by the results of a prospective 32-year study conducted in the United States by the Centers for Disease Control and Prevention [10], which showed that with an increase in anxiety, the probability of fatal myocardial infarction increases by 1.9 times and the risk of sudden death increases by 4.5 times.

At the same time, numerous socio-epidemiological studies (according to the data of National Research Center for Preventive Medicine) showed a tremendous increase in psychological stress. Thus, about 70 % of people live under medium and high levels of stress [11].

In this regard, special attention is paid to the study of the role of anxiety in the development of hypertension. It is known that hypertension is one of the most common cardiovascular diseases, which affects, in particular, 25–35% of the population of Russia. On the one hand, the major studies have demonstrated the correlation between anxiety or depression symptoms and hypertension development, and, on the other hand, hypertension is considered to be a psychosomatic disorder [12]. At the same time, many authors indicate increased anxiety as one of the risk factors for food addiction and, as a result, overweight and obesity development [13, 14, 15].

The objective of the study was to identify the prevalence of anxiety syndrome in young men (of working age) with hypertension, to compare its frequency depending on the presence or absence of obesity (OB), and to trace its relationship with left ventricular remodeling indicators in accordance with echocardiographic data (Echo) and eating behavior.

Materials and methods

The study included 80 patients with hypertension between the ages of 34 and 58 (mean age of 49 [44; 54]) who were hospitalized either due to the deterioration of the disease course or for routine examination. The examination of patients included a thorough analysis of anthropometric parameters (height, body weight, calculation of BMI, measurement of waist circumference (WC), hip circumference (HC) along with the calculation of waist-hip ratio). Patients were surveyed to evaluate their psychoemotional status. The questionnaire was chosen in conjunction with leading psychologists at the center of psycho-diagnostics at the hospital medical unit of the MIA of Russia in Nizhny Novgorod Region. In order to identify the presence of anxiety syndrome, all patients were interviewed in written form. The Spielberg-Hanin scale of trait and state anxiety as well as the Beck scale (to exclude depression) were used. The Dutch Eating Behavior Questionnaire (DEBQ) was used to determine the presence and type of eating disorders. Additional examination included echocardiography (Echo) with calculation of standard parameters and 24-hour ambulatory blood pressure monitoring (ABPM). Statistical processing of the data was carried out with STATISTICA 6.0 software (StatSoft) using nonparametric methods: the parameters of descriptive statistics: the data obtained are presented as medians and interquartile range (Me [25 %; 75 %]). The Mann-Whitney U test was used to assess the significance of differences between two unrelated samples. The correlation analysis was carried out using the Spearman criterion; $p < 0.05$ was used as the error probability.

Prior to participating in the study, all patients signed an informed consent form. This study was approved by the local ethics committee.

Results

Depending on the BMI, all patients were divided into 2 groups:
Group 1 (main) consisting of patients with OB — BMI ≥ 30 kg/m², 42 patients,
Group 2 (control) consisting of those with BMI < 30 kg/m² — 38 patients.

A comparative anxiety indicators analysis in patient groups with hypertension showed a significantly more pronounced rate of prevalence in patients with OB (Table 1).

The main and control groups were compared based on the presence and level of depression using the Beck scale. It was established that patients with obesity demonstrated no difference in the depression level. On the contrary, their depression scale indicators were more favorable in comparison with normal body weight patients (in patients with obesity: 4.5 [2; 10.5] points, in normal body weight patients: 9 [0; 15] points, p = 0.32).

OB in our patients was accompanied by more pronounced signs of ventricular remodeling (Table 2).

This feature, which is quite logical, corresponded with the ABPM profile, which showed higher BP in patients with OB (Table 3).

At the same time, the presence of a significant difference in the level of anxiety (which was not in favor of patients with OB) dictates the expediency of the question: is there any connection between the anxiety level and Echo indicators of ventricular remodeling? To answer this question, we conducted a correlation analysis of TA and SA severity with Echo indicators in groups of patients with and without OB (Table 4).

Table 1. *Comparison of patients with obesity and normal body weight according to the severity of anxiety*

Characteristic	Group 1 (with obesity) N=42	Group 2 (normal body weight) N=38	P-value
State anxiety (SA), scores	39.5[36;42]	36[28;38]	0,0028
Trait anxiety (TA), scores	39[36;43.5]	33.5[29;36]	0,000008

Table 2. *Comparison of Echo-indices in patients with hypertension in the presence or absence of OB*

Characteristic	Group 1 (with OB) N=42	Group 2 (normal body weight) N=38	P-value
Ejection fraction, %	62[56;65]	65[59;66]	0,09
Left atrium thickness, mm	40[38;45]	36[34;41]	0,0002
Right atrium thickness, mm	32[28;38]	31[28;38]	0,96
Left ventricle end-diastolic diameter, mm	50[48;53.5]	50[47;52]	0,51
Left ventricle end-systolic diameter, mm	33[31;38]	33[30;36]	0,3
Right ventricle thickness, mm	30[23;30]	25[23;28]	0,04
Left ventricle end-diastolic volume, ml	119[110;155]	122.5[113;137]	0,97
Left ventricle end-systolic volume, ml	45.5[41.5;78]	40.5[35;50]	0,08
Interventricular septum thickness, mm	14[12.5;15]	11[11;13]	0,000004
Left ventricle posterior wall thickness, mm	13[11.5;14.5]	11[10;12]	0,00003
Myocardial mass, g	279[233;329]	195[180;228]	0,00001
Myocardial mass index	121[112;128]	99.5[91;116]	0,00008

Table 3. *Comparison of ABPM indices in patients with obesity and normal body weight*

Characteristic	With obesity N=42	Normal body weight N=38	P-value
Mean day SBP	131[126;145]	128[119;136]	0,045227
Mean pulse pressure	46[41;51]	42[38;45]	0,027034
Maximum SBP, day	163.5[151;180.5]	152[142;165]	0,024400
Maximum SBP, night	133[123;144]	100[87;103]	0,049362
Maximum 24-hour SBP	164[151;181]	11.5[9;15.5]	0,036122
Variability of DBP, day	10[8;12]	31[23;39]	0,064068
Variability of DBP, night	10[8;11]	13[9;24]	0,005733

Table 4. *Correlation of TA and SA severity with Echo indicators in patients with and without OB*

Communication indicators	Spearman	P-value
SA & Ejection fraction	0,146654	0,342143
SA & Left atrium thickness	-0,034260	0,825267
SA & Right atrium thickness	0,117759	0,457648
SA& Left ventricle end-diastolic diameter	-0,032788	0,834665
SA& Left ventricle end-systolic diameter	-0,019137	0,904252
SA & Right ventricle thickness	-0,147244	0,352092
SA & Left ventricle end-diastolic volume	0,003433	0,986169
SA & Left ventricle end-systolic volume	-0,002759	0,989104
SA & Interventricular septum thickness	0,101104	0,518859
SA & Left ventricle posterior wall thickness	0,112443	0,472823
SA & Myocardial mass	-0,108641	0,493436
SA & Myocardial mass index	-0,019942	0,900245
TA & Ejection fraction	0,062631	0,686297
TA & Left atrium thickness	0,280526	0,065116
TA & Right atrium thickness	0,205761	0,191118
TA & Left ventricle end-diastolic diameter	0,259936	0,092305
TA& Left ventricle end-systolic diameter	0,203187	0,196851
TA & Right ventricle thickness	0,093394	0,556342
TA & Left ventricle end-diastolic volume	0,298297	0,123118
TA & Left ventricle end-systolic volume	0,237637	0,232649
TA & Interventricular septum thickness	0,356764	0,018855
TA & Left ventricle posterior wall thickness	0,217646	0,160911
TA & Myocardial mass	0,379165	0,013273
TA & Myocardial mass index	0,256466	0,101113

Note: EF — ejection fraction, LA — the left atrium wall thickness, RA — the right atrium wall thickness, LV (EDD) — left ventricular end-diastolic diameter, LV (ESD) — left ventricular end-systolic diameter, RV — the right ventricle wall thickness, EDV — left ventricular end-diastolic volume, ESV — left ventricular end-systolic volume, IVST — the interventricular septum thickness, LPWT — the left ventricle posterior wall thickness, MM — the myocardial mass, MMI — myocardial mass index

As it can be seen from the table, the anxiety syndrome in patients with OB significantly correlated with Echo indicating left ventricular hypertrophy (LVH) — IVST, MM, while in normal body weight patients no correlation was revealed (according to the results of a similar analysis).

Thus, anxiety syndrome, which is detected significantly more frequently in patients with hypertension on the background of obesity has a correlation with left ventricular remodeling indicators.

When the causes of such a high anxiety level in the group of patients with hypertension and obesity were analyzed, close attention was paid to eating disorder, which is known to trigger the development and progression of OB. We have discovered that the restrained and external types of eating behavior were dominant in both groups. The presence and type of eating disorder were assessed using the DEBQ questionnaire. To answer the question "Is there any relationship between anxiety level and eating disorders?" we conducted a correlation analysis (Table 5). Emotional type of eating behavior due to its rare occurrence was not taken into account.

As it can be seen from the table, a direct correlation was established between trait anxiety and eating disorders.

At the same time, according to the Spearman's rank correlation results in the hypertension patients' group with normal body weight patients, there was no correlation between anxiety and eating disorders (Table 6).

On the basis of the conducted study, we are able to conclude that OB in patients with hypertension is associated with the inclusion of additional pathogenesis mechanisms (besides well-known hormonal, metabolic and hemodynamic, pathogenesis mechanisms), which lead to the myocardial pathology progression. In particular, it is anxiety, which relationship to ventricular remodeling was revealed in our study. It is significant that anxiety syndrome in OB patients is directly associated with eating disorders, such as restrained and external types of eating behavior. The question remains unclear: whether eating disorders are primary and lead to anxiety or, on the contrary, anxiety provokes eating disorders.

From a practical standpoint, these disorders should be identified as soon as possible, and measures to correct not only the BP level, but also the patient's psychoemotional status, which may improve the treatment effectiveness, should be conducted.

Table 5. *Correlation of anxiety level with types of eating disorders in patients with hypertension and obesity*

Type of anxiety	Type of eating disorder	Spearman	P-value
SA	Restrained	0,110367	0,475723
SA	External	0,048511	0,757386
TA	Restrained	0,245634	0,010801
TA	External	0,340439	0,025495

Table 6. *Correlation of anxiety level with types of eating disorders in patients with hypertension and normal body weight*

Type of anxiety	Type of eating disorder	Spearman	P-value
SA	Restrained	0,226461	0,197781
SA	External	0,115263	0,516258
TA	Restrained	0,111605	0,529750
TA	External	0,106006	0,550719

Conclusions

1. Patients with hypertension accompanied by OB suffer from an increased level of anxiety in comparison with normal body weight patients.
2. The trait and state anxiety in patients with obesity correlate with left ventricular hypertrophy.
3. A relationship between anxiety syndrome in patients with OB and restrained and external types of eating behavior was revealed.
4. The timely detection of these states in patients with OB by surveying patients makes it possible to optimize treatment using not only medicines (antihypertensive drugs) but also psychocorrective methods.

Conflict of interests

The authors declare no conflict of interests.

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