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The Effect of Taurine on the Clinical Course and Mid-Term Prognosis of Chronic Heart Failure in Patients with Ischemic Heart Disease

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Abstract: In this work, we studied the effect of taurine on the clinical manifestations of heart failure in patients with ischemic heart disease, the functional state of the cardiovascular system, the level of biomarkers and the prognosis of the disease. The effectiveness of the additional use of taurine for the treatment of chronic heart failure (CHF) is beyond doubt, which is due to the ability of the drug to reduce tissue ischemia and hypoxia. At the background of 12-month therapy with taurine at a dose of 750 mg per day, 56% of patients with chronic heart failure II and III functional class (FC) (according to New York Heart Association (NYHA), due to ischemic heart disease, there is a significant decrease in the functional class of CHF ($p < 0.01$).

KEY WORDS: Chronic failure, heart failure, ischemic heart disease, dibicor

INTRODUCTION

Chronic heart failure complicates the course of many diseases of the cardiovascular system, while there is an increase in the number of patients, high mortality, disability and social maladjustment of patients remain [3,6]. Currently, 15 million people live with heart failure in Europe, 6 million in the United States, about 8 million in the Russian Federation [10]. At the beginning of the XXI century, 17-45% of hospitalized patients with heart failure die within 1 year of follow-up and more than 50% - within 5 years, although there is a tendency towards a decrease in mortality [1,2,9]. No less difficult problem in medicine is the problem of decompensation of chronic heart failure, requiring hospitalization of patients, accompanied by hospital mortality up to 10%. Within a year, up to 30% of patients are again sent to the

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hospital with an increase in the functional class of heart failure [15]. In turn, the treatment of such patients requires significant financial costs (26-39 million euros per 100 million people in Europe), accounting for 1-3% of total health care costs in North America, Western Europe and Latin America and 6% in Russia. Federation [4,8,9].

Currently, the main provisions of the drug treatment of chronic heart failure have been determined, implying the normalization of intracardiac and central hemodynamics, microcirculation, activity of the body's neurohumoral systems, prevention and therapy of cardiac arrhythmias, sudden cardiac death, and thromboembolic syndrome [7,9,11]. The principles of treatment of CHF with a low ejection fraction have been most fully developed, while with the preserved ejection fraction, new drugs are being sought to improve the quality of life of patients, which can reduce the frequency of readmission and improve the prognosis of the disease [12,14]. One of these areas is the use of drugs with a positive effect on cell metabolism [1,6,7]. One of these drugs is taurine, the clinical efficacy of which has been shown in patients with severe chronic heart failure [10,12], intoxication with cardiac glycosides, and various cardiac arrhythmias [14]. At the same time, there are isolated works on the effectiveness of the drug in patients with CHF with preserved ejection fraction [4], the effect of taurine on the stiffness of resistive vessels, diastolic function of the left ventricular myocardium and the level of biomarkers reflecting the effectiveness of treatment and prognosis of the disease [3,5,9], which makes the proposed topic relevant.

MATERIALS AND RESEARCH METHODS

Investigated 117 patients with coronary heart disease complicated by chronic heart failure II-III functional class according to NYHA classification, aged from 54 to 76 years, 50 men and 67 women. Of these, 62 patients had FC II CHF, 55 - FC III CHF. The duration of CHF ranged from 2.5 years to 8 years. The reason for the development of congestive heart failure was postinfarction cardiosclerosis (59 patients) and other forms of coronary artery disease (58 patients). The duration of CHD ranged from 3 to 12 years. The diagnosis was established on the basis of the clinical picture of the disease, anamnesis, ECG, echocardiography, coronary angiography, and data on the determination of the six-minute walking distance. Arterial hypertension was diagnosed in 78 patients.

Patients were observed on an outpatient basis and received standard CHF therapy, which included angiotensin converting ferment (ACE) inhibitors or angiotensin II receptor blockers, beta-adrenergic receptor blockers, diuretics, acetylsalicylic acid. 22 patients (19.7%) took nitrates, 14 patients took calcium channel blockers, 94 patients (80.3%) took statins. During the observation period, the doses of drugs were not changed. After obtaining informed consent, the patients were divided by lot into two groups: group 1 - 73 patients who received, in addition to the recommended CHF therapy, a course of taurine treatment 750 mg/day. (drug Dibicor (Taurinum), "Peak-Pharma", RF, 500 mg in the morning + 250 mg in the evening) for 12 months, group 2 (control) - 44 patients who did not receive taurine treatment. During the

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observation period, 6 patients stopped taking the drug and 3 patients from group 1 died, 5 patients did not complete the study and 2 patients from the second died, therefore the main group consisted of 64 patients, the control group - 37 patients with CHF P-III FC. Patient groups were comparable in terms of age, presence of concomitant diseases, and drug therapy (Table 1, Table 2).

Table 1

Distribution of patients by age, forms of ischemic heart disease, functional classes of CHF and therapy received

Indicators	Group 1 (P = 64)	Group 2 (P = 37)
Age	67,1±4,8	65,3±4,4
Sex		
Men	30 (47%)	16 (41%)
Women	34 (53%)	21 (57%)
Postinfarction cardiosclerosis	31(49%)	17 (46%)
Other forms of ischemic heart disease	33(51%)	20 (54%)
Functional class of CHF		
	36 (58%)	23 (62%)
	28 (42%)	14 (38%)
Therapy		
ACE inhibitors	40 (63%)	22 (59%)
Angiotensin II blockers	14 (22%)	10 (27%)
P-blockers	56 (88%)	30 (81%)
Spironolactone	38 (59%)	19 (51%)
Loop diuretics	24 (38%)	16 (43%)
Aspirin	56 (88%)	31 (84%)
Statins	57 (89%)	30 (81%)

The incidence of comorbidities is shown in Table 2

Table 2

Indicators	Group 1 (P = 64)	Group 2 (P = 37)
Arterial hypertension	44 (61%)	21 (57%)
CVB	16 (25%)	8 (22%)
Chronic bronchitis	9 (14%)	3 (8%)
Type 2 diabetes mellitus	18 (28%)	12 (32%)
Peptic ulcer	7 (11%)	3 (8%)

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Gallstone disease	8 (13%)	3 (8%)
Urolithiasis	8 (13%)	2 (5%)
Varicose veins of the lower extremities	12 (19%)	9 (24%)

The exclusion criteria in our study were

1) Patients with malignant neoplasms within the last 5 years;

2) Patients with chronic arrhythmias and cardiac conduction disorders (a permanent form of atrial fibrillation, atrioventricular block II-III degree, persistent ventricular tachycardia, complete blockade of the bundle branch);

3) Ejection fraction <50%;

4) Women of childbearing age who do not use adequate methods of contraception and pregnant women;

Hemodynamically significant lesion of the heart valve apparatus;

Normal NT-proBNP level

Lack of patient consent to participate in the study. The following research methods were used:

assessment of the clinical state: the functional class of heart failure was assessed using a scale for assessing the clinical state and by means of a 6-minute walk test at the 1st and last patient visits to the clinic;

12-lead electrocardiogram registration at all visits;

transthoracic echocardiography at first and last visits;

Doppler echocardiography at the first and last visits;

determination of elastic-elastic properties of arterial vessels at the first and last visits.

Determination of NT-proBNP and galectin 3 in blood at the first and last visit

The effect of taurine on the clinical course and mid-term prognosis of CHF in patients with ischemic heart disease

To solve this problem, all patients were divided into two groups on the basis of the clinical picture of the disease, instrumental examination methods.

The first group consisted of 64 patients with coronary artery disease who had clinical symptoms of CHF II-III FC according to NYHA classification, with an ejection fraction of more than 50%, who were added to the standard therapy of CHF and IHD, which included ACE inhibitors, beta-blockers, spironolactone, antiplatelet agents, statins. taurine (drug Dibikor, "Peak-Pharma", daily dose - 750 mg). The second group consisted of 37 patients with similar criteria who received standard therapy.

The main complaints of the studied patients were shortness of breath and palpitations during exercise, increased fatigue, interruptions in the work of the heart, swelling of the ankles. The dynamics of the functional class of CHF in patients was assessed by the results of the 6-minute walk test.

In both groups, there was an improvement in the clinical condition in most patients,

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which was manifested in a decrease in shortness of breath, fatigue, and palpitations during exercise in 41 patients (64%) of the main group and in 13 patients (35%) in the control group. In total, this was expressed in a significant decrease in the total scores according to SHACS in the main group from 5.9 ± 0.19 points to 5.2 ± 0.16 points ($p < 0.05$) and the same trend in the control group from 6.1 ± 0.21 points to 5.6 ± 0.16 points ($p = 0.061$). A decrease in the functional class of CHF was also revealed in both groups, according to the six-minute walk test (Tables 3.1, 3.2). In both groups, a significant increase in the distance covered for 6 minutes was recorded in patients with FC II CHF, as well as in patients of the main group with FC III CHF.

In the group of patients taking taurine, by the end of the observation period, a decrease in the functional class of CHF was noted in 36 out of 64 patients (56%), in the control group - in 14 out of 37 (38%). It should be noted that in 8 patients (13%) of the main group and in 7 patients (19%) of the control group there was an increase in the functional class of CHF (Table 3).

Table 3

The effect of taurine on the 6-minute walking distance in patients with coronary artery disease, complicated CHF II FC

Indicators	Distance six-minute walk test, m		
	before treatment	after treatment	p
Main group (n=36)	336±40,2	485±49,5	<0,05
Control group (n=23)	322±35,9	426±46,0	<0,05

Table 4

The effect of taurine on the 6-minute walking distance in patients with coronary artery disease, complicated CHF III FC

Indicators	Distance six-minute walk test, m		
	before treatment		before treatment
Main group (n=28)	216±23,1	328±35,4	<0,02
Control group (n=14)	242±31,5	289±37,7	>0,05

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Table 5
The effect of taurine on the clinical course of CHF in patients with ischemic heart disease

	Decreased FC CHF			Increased FC CHF		
	qty	%	p	qty	%	p
Main group (n = 64)	36	56	p<0,01	8	13	p>0,05
Control group (n = 37)	14	38	p<0,05	7	18	p>0,05

For 12 months of observation, 6 patients (9%) from the main group and 7 patients (19%) from the control group were hospitalized. The reasons for the hospitalization of patients taking taurine were decompensation of CHF in 3 cases, the development of a hypertensive crisis in 2 cases, and acute community-acquired pneumonia in one. In the control group, hospitalization was caused in one patient by acute coronary syndrome, CHF decompensation in 6 patients.

CONCLUSION

During the observation period, 3 patients (4.7%) of the main group and 2 patients (5.4%) of the control group died, who were not included in the processing of the obtained results. The causes of death in patients treated with taurine were acute myocardial infarction, acute cerebrovascular accident, and acute decompensation of chronic heart failure. In the control group, one patient developed acute myocardial infarction, the other - pulmonary edema.

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The results obtained indicate a positive effect of taurine on the clinical course of CHF, a decrease in re-hospitalizations due to decompensation of heart failure, and the absence of an improvement in the one-year prognosis in patients with coronary artery disease with FC II-III chronic heart failure.

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