DIABETES MELLITUS with ARTERIAL HYPERTENSION

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ABSTRACT

The aim of the study was to identify differences in the course of hypertension in individuals with and without impaired carbohydrate metabolism.

Material and methods. 60 people were examined: 29 with hypertension, 31 with hypertension and DM.

Results.The values of the lipid spectrum between the patients of the two groups did not significantly differ, except for the figures of total cholesterol, which was higher in patients with disorders in carbohydrate metabolism. Uric acid levels also did not differ between the groups. Creatinine concentration was higher in people with diabetes mellitus, but within the limits of the reference values. All the average values for systolic and diastolic blood pressure in the daytime and at night were recorded at a significantly higher level in people suffering from combined pathology. However, there were no significant differences in indicators characterizing the size of the heart and the mass of the left ventricular myocardium between the groups.

Conclusion. It is necessary to be more careful and dynamically monitor lipid and carbohydrate metabolism, indicators of filtration activity of the body, blood pressure levels in order to prevent the occurrence of catastrophic consequences from the heart and kidneys.

Key words: arterial hypertension, diabetes mellitus, kidneys.

INTRODUCTION

Arterial hypertension (AH) and diabetes mellitus (DM) remain one of the most common diseases on the globe today. Their prevalence in the global community

is constantly growing and is projected to increase in the coming years. In addition, DM and AH are two interrelated pathologies that have a powerful addictive damaging effect, with rapid development of complications aimed at several target organs at once: the heart, kidneys, cerebral vessels and retina. And as a result, there is a significant increase in the risk of stroke, ischemic disease heart failure, congestive heart failure, other cardiovascular diseases and events that significantly increase disability and mortality among patients. In general, 80% of such patients die due to cardiovascular diseases: 65% - from acquired heart pathologies, 15% — from cerebral circulatory disorders. Among patients with arterial hypertension, the prevalence of DM is 2-2.5 times higher than among people without high blood pressure (BP). In addition, the risk of diabetes over the next 5 years in patients with hypertension is 2.5 times higher, than

in the general population. The probability of developing hypertension on the background of diabetes increases depending on

the type of diabetes, the age and ethnicity of the patient, the presence of obesity and other components of the metabolic syndrome. As a result, more than 80%

of patients with type II diabetes suffer from elevated blood pressure. The course of arterial hypertension in patients with DM is characterized by a number of features. First of all, this is a high pulse pressure, which reflects an increase in the stiffness of medium - and large-caliber arteries and is a predictor of a poor prognosis. Increased pulse pressure 10 mmHg correlates with an increase in mortality due to cardiovascular diseases by 20%. In patients with diabetes mellitus, high blood pressure is often recorded at night, there is a violation of the circadian rhythm (normally blood pressure at night is 10-20% lower compared to the daytime period). Pronounced fluctuations in blood pressure during the day, as well as a tendency to orthostatic hypotension, are due to a violation of blood pressure regulation and the presence of neuropathy.

In our study, we decided to analyze the instrumental and laboratory parameters of patients suffering from hypertension in combination and without diabetes.

MATERIALS AND METHODS OF RESEARCH

The study included persons with type II diabetes and hypertension (BP>140/90 mmHg). Persons with secondary hypertension, congestive heart failure (HF) of functional class III—IV according to NYHA, and the consequences of a heart attack were not analyzed myocardial or surgical intervention on the heart.

60 patients were studied: 29 people with elevated blood pressure, 31 patients with hypertension were accompanied by a violation of carbohydrate metabolism.

An ECG was recorded in 12 standard leads for all, and general indicators (erythrocytes, hemoglobin, leukocytes, platelets) were determined and biochemical (creatinine, uric acid, lipid profile) blood tests. Echocardiography was performed to determine the ejection fraction (EF), end-diastolic (CDR) and end-systolic (CSR) dimensions of the left ventricle, the thickness of the interventricular septum (TMJ) and the thickness of the posterior wall of the left ventricle (TSLJ), and the dimensions of the right ventricle (RV), left atrium (LP) and aorta were also measured. Based on the results of daily blood pressure monitoring, it was calculated the average values for systolic and diastolic blood pressure in the daytime and at night. The indicators of the general urine analysis were taken into account with the quantitative determination of the isolated protein.

The dynamics of the ST segment was also analyzed in all patients using daily Holter ECG monitoring. Statistical processing of the obtained data was carried out using the Excel 7.0 program using the software package (GraphPadInStat 3.0). The intergroup comparison was carried out using the Mann—Whitney method using the criterion Fischer. To identify the relationship between The Spearman linear correlation

analysis method was used for the indicators. The results are presented as M±SD, where M is the sample mean and SD is the sample standard deviation. The differences were considered significant at $p<0.05$.

THE RESULTS AND THEIR DISCUSSION

The groups were comparable in age — (52.8±10.7) and (54.3±13.1) years, p=n.s., in duration of hypertension — (6.5±2.4) and (6.9±3.0) years, p=n.s., according to the mass index body weight — (33.8±2.8) and (33.7±1.7) kg/m2, p=n.s. All patients were on comparable antihypertensive and lipid-lowering therapy. Peripheral blood parameters did not differ significantly between the groups (Table 1).

Table 1

Indicators of clinical blood analysis

indicator	AH (29 people)	AH+DM (31people)	*p*
Erythrocytes	4.5±0.4	4.4±0.5	n.s.
Leukocytes	6.4±0.9	6.3±1.0	n.s.
Platelets	268.8±44.6	285.0±53.3	0.01
Hemoglobin	135.04±14.2	132.7±14.9	n.s.

In biochemical blood tests, we were interested in lipid metabolism indicators, as well as creatinine and uric acid levels. The values of the lipid spectrum, oddly enough, did not significantly differ between the patients of the two groups, except for the figures of total cholesterol, which was higher in patients with disorders in carbohydrate metabolism. Uric acid levels also did not differ between the groups. But the concentration of the indicator characterizing the filtration capacity of the kidneys was higher in people with diabetes mellitus, but within the reference values (Table 2).

The results of instrumental studies were based on data from echocardiography and daily blood pressure monitoring. All the average values for systolic and diastolic blood pressure in the daytime and at night were recorded at a significantly higher level in people suffering from combined pathology. Despite this, we did not find significant differences in indicators characterizing the size of the heart and the mass of the myocardium of the left ventricle between the groups after an ultrasound examination of the heart. The only difference between the patients was their global contractility myocardium, which was higher in individuals with hypertension.

Table 2

Indicators of biochemical blood analysis

indicator	AH (29 people)	AH+DM (31people)	*p*

Total cholesterol	5.6±1.2	6.3±0.9	0.02
HDL cholesterol	1.59±0.6	1.51±0.58	n.s.
LDL cholesterol	2.37±1.0	2.7±0.9	n.s.
Triglycerides	2.7±1.2	2.3±1.2	n.s.
Uric acid	335.9±121.8	301.2±67.2	N.s.
Creatinine	73.1±23.4	103.6±31.3	0.0002

We did not find significant differences in the indicators of the general urinalysis. However, the amount of isolated protein was higher in the group of patients suffering from hypertension and diabetes than in those with elevated blood pressure — (0.066±0.024) g/l and (0.001±0.006) g/l, respectively (p=n.s.).

The factors responsible for the occurrence of complications from the cardiovascular system in patients with DM are hyperglycemia, dyslipidemia and hypertension. Adequate control of the above indicators significantly improves the prognosis of persons with diabetes suffering from impaired carbohydrate metabolism. The same factors need to be controlled for patients with essential hypertension or hypertensive disease, because over time, against the background of overweight, impaired lipid metabolism, they show signs of impaired carbohydrate tolerance, which then in 40% of patients are transformed into a detailed picture

Type II DM. It was revealed that the basis is a single pathogenetic mechanism — insensitivity of peripheral tissues (muscle, fat, endothelium) to the action of insulin (the so-called insulin resistance). In our study, an increase in the index was also detected in both groups body weight to obesity of the 1st degree, and a violation

of lipid metabolism, and an increase in blood pressure to the 1-2 degree. In addition, group 2 patients also had diabetes mellitus. Do not forget about such a fact asthe duration of hypertension. In our patients, it exceeded 5 years on average. Comparing this with scientific data, we can assume that in the near future some patients with hypertension may move to the group with diabetes due to the progression of insulin resistance. A negative point is the possible deterioration of kidney function in our patients in mind the presence of two triggering factors. The first is hyperglycemia, which has a damaging effect on the microcirculatory system, including the vessels of the glomeruli. The second factor is hyperlipidemia. Dyslipidemia has been found to have a nephrotoxic effect. Violation of lipid metabolism causes damage to the capillary endothelium, damage to the glomerular basement membrane, mesangium proliferation, which leads to glomerulosclerosis and, as a result, proteinuria. In combination with high blood pressure, the presence of two additional factors contributes to a faster

violation

kidney function and earlier development of renal insufficiency to varying degrees. In our study, 27% of patients with hypertension and DM and more than 4% of patients with hypertension alone had protein loss in urine, which is close to the data of other researchers: the prevalence of microalbuminuria in patients with hypertension without DM is less than 7%; prevalence of microalbuminuria in patients Type II diabetes and HYPERTENSION are about 30-40%.

Do not forget the fact that patients with DM have a number of features of the course of hypertension. Thus, according to the results of several studies, it was revealed that most patients belong to the category of "nondippers", i.e. they do not have a sufficient (physiological) decrease in blood pressure at night.

These disorders are caused by a violation of the activity of the autonomic nervous system, which has lost the ability to regulate vascular tone. But in our study, patients of both groups had a sufficient degree of blood pressure reduction at night.

Another feature is the high pulse pressure, which indicates an increase in the stiffness of medium- and large-caliber arteries and is a predictor of a poor prognosis. In the study, pulse pressure during daytime hours in the AH and DM group was 10% higher than in patients with AH. During the night hours, this difference reached 10 mmHg and 20%, respectively. And an increase in pulse pressure by 10 mmHg, in turn, is correlated with an increase in mortality due

to cardiovascular diseases by 20%. The average blood pressure values in the daytime and at night were 11-12% higher in people with hypertension and diabetes compared with patients without carbohydrate metabolism. Both hypertension and diabetes affect the occurrence and progression of coronary heart disease (CHD) as

individually and collectively. Our data indicate a high prevalence Coronary heart disease in people with hypertension and diabetes. Thus, 50% of patients had verified coronary artery disease and 8 (31%) patients registered changes according to Holter ECG monitoring that fall under the criteria of myocardial ischemia. While in the other group, the prevalence and changes in Holter were recorded in 8 and 4%, respectively.

CONCLUSIONS:

Numerous studies have proven that active blood pressure reduction is a more important factor in reducing the incidence of cardiovascular complications and slowing the progression of kidney damage than intensive glucose control, and in combination with effective glucose control, treatment results are much better. Based on the results of our study, it can be concluded that it is necessary to more carefully and dynamically monitor lipid and carbohydrate metabolism, indicators of filtration activity of the body, blood pressure levels in order to prevent the occurrence of catastrophic consequences from the heart and kidneys in patients with diabetes mellitus. On the other hand, it is important to warn patients with high blood pressure against a possible violation of

carbohydrate metabolism by constant monitoring and correction of relevant factors.

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Международной научно-практической конференции молодых учёных и студентов, IV Всероссийского форума медицинских и фармацевтических вузов «За качественное образование»,(Екатеринбург, 10-12 апреля 2019): в 3-х т.-Екатеринбург: УГМУ, CD-ROM.. Федеральное государственное бюджетное образовательное учреждение высшего образования «Уральский государственный медицинский университет» Министерства здравоохранения Российской Федерации.

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