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METABOLIC SYNDROME AS A FACTOR IN THE DEVELOPMENT OF HYPERTONIC DISEASE

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Annotation: *The article is devoted to the study of the status of the metabolic syndrome, contributing to the development of hypertension, and its "companion" as a violation of the lipid composition of the blood, which is very often clinically manifested by the development of forms of ischemic heart disease.*

Key words*: risk factors, arterial hypertension, lipid, spectrum, blood plasma.*

Introduction

Arterial hypertension (AH) is a major risk factor for cardiovascular disease (CVD), which significantly contributes to morbidity and mortality worldwide. The main reason for the development of hypertension is damage to peripheral vessels, while their deformation occurs, as a result of which there are metabolic dysregulations, malfunctions in the medulla oblongata and hypothalamus appear [1]. The prevalence of hypertension in the United States, depending on age and gender, if a person lives to 70 years, then 50% of all people are hypertensive [9]. According to modern literature and research of scientists G.F. Lang (Russia) and G. Selye (Canada), the pathogenetic mechanism of the development of hypertension and risk factors affecting its prognosis are known. At the same time, the role of stress and mental trauma is proved, depending on personal characteristics and hereditary predisposition [3].

One of the most frequent and dangerous "companion" of hypertension is a violation of the lipid composition of the blood, found in 40 - 85% of patients with hypertension, which is very often clinically manifested by the development of various forms of coronary heart disease (CHD). Blood pressure and plasma cholesterol levels, along with age, sex and smoking, underlie the 10-year risk of death from cardiovascular disease. [four]. It is known that an increase in cholesterol levels in hypertensive patients by 1% increases the risk of coronary heart disease by 2% [5]. At the same time, not only elevated, but high normal levels of triglycerides (TG) and low-density lipoprotein cholesterol (LDL-C) increase the risk of cardiovascular complications in hypertensive patients [13].

When conducting the Framingham study, it was found that the incidence of coronary artery disease in middle-aged men whose blood pressure exceeds 160/95 mm Hg. Art., 5 times higher than in men with normal blood pressure[5]. According to other sources, an increase in blood pressure for every 10 mm Hg. Art. increases the risk of developing heart disease by 30% [7]. At the same time, the negative effect of lipid

disorders and atherosclerosis on the level of blood pressure (BP) has been proven. Thus, when conducting a study among American residents, it was found that the level of TG and LDL cholesterol in blood plasma is associated with the presence of arterial hypertension in them [11].

It is known that primary insulin resistance (IR) is the pathophysiological basis of subsequent metabolic disorders. The most typical disorders in IR syndrome are lipid spectrum disorders [14]. Lipoproteins are currently considered not only as a cholesterol transport system, but also as participants in the metabolism of endothelium, monocytes, macrophages, lymphocytes, extracellular matrix, smooth muscle cells [14]. They can regulate the work of secondary cell messengers, change the sensitivity to catecholamines, insulin, prostacyclin, therefore, it is advisable to study not only individual components of the lipid spectrum, but also their combinations, which will allow timely initiation of preventive measures to prevent both the formation of MS in general and further AG progression. Lipid spectrum disorders can be early markers of both MS and atherosclerosis, which requires timely preventive measures aimed at changing the lifestyle of the younger generation [6].

Materials and research methods

The study included 135 patients with stage I and II hypertension aged 30 to 70 years (mean age 54.0 ± 1.0) hospitalized in the Bukhara Regional Cardio logical Dispensary (BOCD) in Bukhara. Hypertension was verified according to the requirements of the World Health Organization (WHO), classified according to the international classification of diseases (ICD-10). All patients underwent clinical, immunological, biochemical, laboratory, functional and anthropometric (PreECG, ECG, weight and height measurements) studies.

Discussion and results

First of all, it should be noted that risk factors for the formation of hypertension are important. In our study, based on the study of anamnestic data and lifestyle, field of activity and profession of patients, the following causal factors were established: The study of the influence of risk factors on the development of hypertension in patients showed the predominance of stress factor and mental load - 63.7%, hypersthenic body type - 56.3% and obesity - 47.4%. It should be noted that among the risk factors studied, the lowest percentage was occupied by a sedentary lifestyle - 18.5%, which in the study confirms the predominant importance of autonomic regulation and constitutional body type, as well as an unmodified obesity factor in the development of hypertension. Thus, the analysis of the frequency of AH in the age-sex aspect shows an increase in the frequency of AH of the 1st degree in men aged 41-70 years - 37 (88.1%), in women aged 41-60 years - 16 (72.7%), while AH of the 1st degree with LVH prevails at the age of 41-70 years, regardless of gender.

An analysis of the frequency of the degree of AH showed the predominance of AH of the 2nd degree in men, starting at the age of 30-40 years - 15.9%, it increases almost 2 times already at the age of 61-70 years - 31.8%, which is 100%. AH of the 2nd degree in women is more often recorded at the age of 41-50 years, it is 92.6%. At the same time, AH of the 2nd degree with LVH occurs 2.1 times more in men - 67.8% than in women - 32.2%. Of the risk factors for the development of hypertension in patients aged 30 to 70 years, the first place is taken by the factor of stress and mental stress - 63.7%, the second place is the hypersthenic body type - 56.3%, and the third place is taken by the factor of obesity - 47.4%. Analysis of the clinical picture and careful collection of anamnesis, as well as clinical and laboratory studies, revealed a co morbid state in patients of the examined group. Co morbidity was established in hypertension

regardless of the severity of hypertension. At the same time, the prevalence of diseases of the gastrointestinal tract of patients was established, regardless of the degree of hypertension, in particular, the prevalence of chronic cholecystitis - 82 (60.7%). In a comparative assessment by sex, chronic cholecystitis prevails in men - 51 (62.2%). Metabolic syndrome (MS) among patients of the 1st group was established in 31 (48.4%), and in the 2nd group - in 68 (95.7%), which in general among all examined patients is 99 (73.3%). When studying the state of carbohydrate metabolism, all patients underwent weight and height measurements to calculate the body mass index (BMI). The metabolic syndrome was established in 91 (67.5%) patients, including 31 (34.1%) patients with AH of 1-degree, 60 (65.9%) patients with 2-degree AH. At the same time, there were 28 (20.7%) patients with AH and overweight with BMI = 25-29, patients with grade 1 obesity with BMI = 30-34- there were 33 (24.5%), with obesity 2- degree with BMI = 35-40 there were 30 (29.7%) patients.

It was interesting to know about BMI depending on the degree of hypertension. In the examined patients in the clinical picture of hypertension, headaches, light dizziness, nausea, deterioration of health, deterioration of vision, cardialgia, tinnitus, sleep disturbance and urination disorder were observed. During laboratory studies, a shift in the studied blood parameters in patients was established depending on the degree of hypertension (see Table 1).

Table1. Blood parameters of the examined patients with hypertension, (M ± m)

Indicators	Control group n = 75	AH 1-st n = 64	AG 2-st n=71
Glucose (g / L)	4,79±0,11	6,0±0,17*	7,92±0,34*
HbA1c (%)	5,80±0,10	6,49±0,30*	7,55±0,35*
Insulin (pmol / L)	4,08±0,22	5,6±0,48*	9,34±0,49*
Homa-IR index	0,86	1,49	3,28
LGD u/l	304,8±8,27	438,0±8,60**	463,3±15,09*
C-peptide ng / ml	1,55±0,08	2,34±0,18*	2,95±0,19*

Note: * Values are reliable in relation to the control group (P <0.05 - 0.001)

Based on the analysis of fasting glucose levels, it was found to increase by 1.25 times in patients with AH of the 1st degree - up to 6.0 ± 0.17 g / l, by 1.65 times in patients with AH of the 2nd degree - 7 , 92 ± 0.34 g / l in relation to the indicator of the control group - 4.79 - 0.11 g / l (p <0.05). The revealed state of relative hyperglycemia is assessed as a state of prediabetes in the examined patients with hypertension. For a more reliable examination and exclusion of diabetes mellitus, a blood test for glycated hemoglobin was performed.

The content of glycohemoglobin has a direct correlation with the level of glucose in the blood and is an integrated indicator of the compensation of carbohydrate metabolism over the past 60–90 days. The rate of formation of HbA1c, as well as HbA1, depends on the magnitude of hyperglycemia, and the normalization of its level in the blood occurs 4–6 weeks after reaching the normal level of glycemia [2]. In our study, there was a tendency to an increase in the level of HbA1c up to 6.49 ± 0.30% in patients of group 1 and up to 7.55 ± 0.35% in patients with grade 2 hypertension versus control-5.80 ± 0.10% (p <0.05). The

established shift in HbA1c tends to increase and confirms the state of prediabetes regardless of the degree of AH in the examined patients, excluding type 1 diabetes mellitus.

During the examination of patients with hypertension, a study of insulin levels was also carried out to determine insulin resistance (IR). An increase in the concentration of insulin by 2.3 times in patients with AH of the 2nd degree was found - 9.34 ± 0.49 pmol / l versus control values - 4.08 ± 0.22 pmol / l. A statistically significant tendency to increase up to 5.6 ± 0.48 pmol / l in relation to the control - 4.08 ± 0.22 mmol / l ($p < 0.05$) was established in case of AH of the 1st degree. To verify IR, the HOMAIR index (Homeostasis Model Assessment Insulin Resistance) was calculated, which showed its increase to 3.28 in patients with grade 2 hypertension. The established excess of the HOMAIR (Homeostasis Model Assessment Insulin Resistance) index indicates the development of MS and prediabetes in patients with grade 2 AH. For differentiation and accurate diagnosis, a blood test for lactate dehydrogenase (LDH) was performed.

The study found an increase in the activity of LGD in patients with hypertension, regardless of the degree of hypertension. With AH of 1 degree, the value of AHP averaged 438.0 ± 8.60 units / l, with AH of the 2nd degree - 463.3 ± 15.09 units / l, which exceeds the control values - 304.8 ± 8.27 units / l ($p < 0.05$). The established increase in the activity of LGD in patients with hypertension confirms the importance of metabolic syndrome in the development of hypertension. For the differential diagnosis of type 1 and type 2 diabetes mellitus, a C-peptide blood test was performed. C-peptide (from the English word “connecting peptide”) is an indicator of insulin itself. It is formed when pro insulin is uncoupled by peptidases. The oligopeptide has no effect on blood sugar levels. C-peptide is usually elevated in type 2 diabetes.

In a study in patients with hypertension, an almost 2-fold increase in C-peptide was found in hypertension of the 2nd degree - 2.95 ± 0.19 ng / ml, 1.5 times in hypertension of the 1st degree -2.34 ± 0 , 18 ng / ml in relation to control values - 1.55 ± 0.08 ng / ml ($p < 0.05$). The results obtained indicate the relationship of the C-peptide with the severity of hypertension and the formation of a state of prediabetes in this case. Among all examined patients with hypertension, metabolic syndrome was established in 73.3% of cases. AH is characterized by co morbidity. In this case, gastrointestinal diseases predominate, regardless of the severity of hypertension. In particular, AHV in 60.7% of cases proceeds against the background of chronic cholecystitis, especially in men - 62.2%. Consequently, for early prevention of the development of hypertension and differential diagnosis with concomitant diseases, it is necessary to study not only carbohydrate, but also lipid metabolism. The study of the lipid spectrum of blood in patients with hypertension showed an increase in the level of total cholesterol up to 6.40 ± 0.18 mmol / l with hypertension of the 1st degree and up to 7.46 ± 0.16 mmol / l with hypertension of the 2nd degree against the indicators of the group control - 5.31 ± 0.13 mmol / l.

Today it is known that cholesterol is involved in the formation of cell membranes in all organs and tissues of the body. On the basis of cholesterol, hormones are created that are involved in the growth, development of the body and the implementation of the reproduction function. Bile acids are formed from cholesterol, which are part of bile, thanks to which fats are absorbed in the intestines. Cholesterol is insoluble in water, therefore, to move through the body, it is "packed" in a protein shell, consisting of special proteins - apolipoproteins. The resulting complex (cholesterol + apolipoprotein) is called lipoprotein. Several types of lipoproteins circulate in the blood, differing in the proportions of their components: very low density lipoproteins (VLDL), low density lipoproteins (LDL) and high density lipoproteins (HDL). High-density

lipoproteins are compounds made up of lipids (fats) and proteins. They provide for the processing and elimination of fats from the body, which is why they are called "good cholesterol". According to clinical guidelines, when assessing cardiac risk, a level of> 1.0 mmol / L for men and> 1.2 mmol / L for women indicates a low risk [8]. In a study in patients with hypertension, an increase in total cholesterol level was found depending on the degree of hypertension. In patients of the 1st group, there was a tendency to an increase in total cholesterol up to 6.40 ± 0.18 mmol / L (P <0.05), and in the 2nd group - up to 7.46 ± 0.16 mmol / L according to the ratio of indicators of the control group - 5.31 ± 0.13 mmol / l (P <0.001). At the same time, the level of HDL was lower than the control values in both study groups: up to 39.1 ± 0.17 mmol / l with hypertension of the 1st degree and up to 37.2 ± 0.82 mmol / l with hypertension of the 2nd degree versus control -45.8 ± 0.82 mmol / L (P <0.05). The established data were statistically significant in both study groups, which indicates the development of MS, in particular, the state of dyslipidemia in patients with hypertension and a tendency to atherosclerosis. Analysis of the LDL level in patients with AH showed its significant increase to 134.8 ± 3.04 mmol / L in patients of the 1st group and to 145.8 ± 3.48 mmol / L in AH of the 2nd degree versus control - 113 , 7 ± 2.37 mmol / L (P <0.05). The obtained result confirms the development of MS in hypertension, regardless of the severity.

It is known that triglycerides (TG) are the main source of energy at the cellular level. TGs usually enter the body with food, with food. Depending on age, they are synthesized in adipose tissue, in the liver and in the intestines. In the course of the study, a slight increase in its level was found depending on the degree of hypertension. A statistically significant increase in the level of triglycerides in patients of group 2 was established to 2.91 ± 0.08 mmol / L versus 2.04 ± 0.04 mmol / L (P <0.05) in the control. Comparative analysis of the carbohydrate and lipid spectrum in hypertension showed a violation of lipid metabolism in patients with high IR. To clarify the development of MS in patients, the atherogenic index was calculated. In confirming the conclusions that dyslipidemia characteristic of hypertension contributes to the development of MS, in particular atherosclerosis, we obtained high indices of the atherogenic index in hypertension, regardless of its degree. At the same time, the atherogenic index was increased to 3.11 ± 0.08 in grade 1 hypertension and to 3.30 ± 0.08 in grade 2 hypertension, compared to 2.64 ± 0.04 in the control group. The results obtained were statistically significant and confirmed the risk of developing cardiovascular diseases, including coronary heart disease, in patients already at the age of 30-40 years.

Conclusion.

The established data were statistically significant in both study groups, which indicates the development of MS, in particular, the state of dyslipidemia in patients with hypertension and a tendency to atherosclerosis. Consequently, the obtained results of the study indicate that lipid metabolism disorders are more associated with insulin resistance. The mechanism of the development of hypertension is more associated with impaired carbohydrate and lipid metabolism and the development of MS. At the same time, the predominance of diseases of the gastrointestinal tract of patients was established, regardless of the degree of hypertension, in particular, the predominance of chronic cholecystitis-82 (60.7%). In a comparative assessment by sex, chronic cholecystitis predominates in 51 men (62.2%).

References:

1. Бобрович, П. В. Лечимся дома. Гипертония /П.В. Бобрович. - М.: Попурри, 2016. - 192 с.

2. Луценко Л.А.Роль гликированного гемоглобина в диагностике и мониторинге сахарного диабета Международный эндокринологический журнал, № 6(62) , 2014.-130-134/- ISSN 2224-0721].

3. Мясников А. Л. Я лечил Сталина: из секретных архивов СССР / А. Л. Мясников с участием Е. И. Чазова - М.: Эксмо, 2011. - 448 с. - ISBN 978-5-699-48731-8.

4.Оганов, Р.Г. Эпидемию сердечно-сосудистых заболеваний можно остановить усилением профилактики / Р.Г. Оганов, Г.Я. Масленникова // Профилактическая медицина. - 2009. - № 6. С.3-7.

5. Ослопов В.Н., Хасанов Н.Р., Чугунова Д.Н, Биллах Х.М. Мембранные нарушения в патогенезе основных факторов риска сердечно-сосудистой смерти - артериальной гипертонии и дислипидемии /Вестник современной клинической медицины -2013. Том 6, вып.5. с.34-38.

6. Плотникова И.В, Суслова Т.Е., Свинцова Л.И., Джаффарова О.Ю., Лугачева Ю.Г. Нарушения липидного спектра в рамках метаболического синдрома на разных этапах формирования эссенциальной артериальной гипертензии в подростковом возрасте//Сибирский медицинский журнал, 2016, Том 31, № 4. С.30-34.

7. Яблучанский, Н.И. Атеросклероз и артериальная гипертензия: две болезни — одна стратегия. В помощь практическому врачу. Атеросклероз и артериальная гипертензия две болезни — одна стратегия / Н.И. Яблучанский, Н.В. Макиенко. - Харьков, 2011. - 203 с.

8. Диагностика и коррекция нарушений липидного обмена с целью профилактики и лечения атеросклероза. Российские рекомендации, VII пересмотр. 2020; 2019 ESC/EAS Guidelines for the management of dyslipidaemias: lipid modification to reduce cardiovascular risk.

9. Шамухамедова Нафиса Шухратовна Артериальная гипертензия: долговременный стресс, патогенез и медикаментозная терапия // Colloquium-journal. 2019. №3-2 (27). URL: https://cyberleninka.ru/article/n/arterialnaya-gipertenziya-dolgovremennyy-stress-patogenez-i-medikamentoznaya-terapiya.

10. FischbachF.T., DunningM.B. A Manual of Laboratory and Diagnostic Tests, 8th Ed. Lippincott Williams & Wilkins, 2008: 1344 p.

11. Williams, R.R. Sodium-lithium countertransport in erythrocytes of hypertension prone families in Utah. Associations of thre e erythrocyte cation transport systems with plasma lipids in Utah subjects / R.R. Williams, S.C. Hunt, H. Kuida, J.B. Smith, K.O. Ash // Hypertension. - 1986. - № 81. - P.30.

12. Balantyne C. Lipid sand CVD management: towards a globa consensus / C. Balantyne [et al.] // Eur. Heart J. - 2005. - № 26. - P.2224-2231.

13. Rubies-Prat J. Low-density lipoprotein particle size, triglyceride-rich lipoproteins, and glucose tolerance in non diabetic men with essential hypertension / J. Rubies-Prat, J. Ordóñez-Llanos, S. Martin [et al.] // Clin. Exp. Hypertens. - 2001. - № 6. - P.489-500.

14. Gidding S.S. Dyslipidemia in the metabolic syndrome in children // JCMS. - 2006. - Vol. 1. - P. 282-285.

