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METABOLIC SYNDROME AND DYSLIPIDEMIA AS A RISK FACTOR FOR MORTALITY FROM CARDIOVASCULAR PATHOLOGY

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Annotation: Cardiovascular diseases remain the leading cause of death among adults worldwide. Hypertension is one of the most common cardiovascular diseases in developed countries of the world. Hypertension is a multifactorial, polyetiological disease. Genetic, environmental, behavioral, and socio-economic factors play an important role in the development and pathogenesis of this disease. In recent years, there has been a steady increase in the frequency of its occurrence among young people. Hypertension is extremely rarely isolated and its distinctive feature is the high frequency of comorbidity with other chronic non-infectious diseases.

Key words: blood pressure, hypertension, diabetes mellitus, cardiovascular diseases, risk factor, metabolic syndrome.

Introduction

The pathogenesis of hypertension and associated complications today remains the subject of active research, despite the fact that the basic mechanisms of blood pressure regulation have been studied in detail and described previously [4]. In recent years, more and more data have been published on the leading role of obesity in the pathogenesis of hypertension [2]. Interest in obesity is primarily due to the fact that it is considered as an independent risk factor for cardiovascular and endocrine diseases [7,8].

More and more data are emerging on the pathogenetic significance of epicardial fat, which is a type of visceral adipose tissue, in the development of cardiovascular diseases. The relevance of the study of epicardial fat is determined by its anatomical proximity to the heart and the absence of fascial boundaries, therefore epicardial fat has a local effect on the coronary vessels, playing an important role in the development of cardiovascular diseases.

Obesity is a leading component of the so-called “metabolic syndrome,” which is a cluster of leading factors in cardiovascular diseases, type 2 diabetes, and atherosclerosis [5]. Experts from different branches of medicine have proposed several different systems of criteria for verifying metabolic syndrome, based on identifying its individual components and determining the required number and set of them. Active discussions continue in search of the most specific and sensitive marker of abdominal obesity as a key component of the metabolic syndrome [3]. However, the study of the role of metabolic syndrome and its individual components in the pathogenesis of hypertension and its complications, despite the significant amount of research carried out in the world, is far from complete, both in terms of diagnosis and in terms of prevention and treatment of cardiovascular diseases.

Purpose of the study: To study the frequency and structure of metabolic syndrome, as well as associated hormonal-metabolic and psycho-emotional disorders in men with hypertension depending on age and stage of the disease to develop approaches to assessing the effectiveness of its treatment.

To achieve the goal of this work, the following tasks are formulated and set:

- to study anthropometric, hormonal-metabolic characteristics, structural and functional parameters of the heart, features of epicardial fat accumulation and psycho-emotional status in patients of a therapeutic clinic, depending on the age and stage of hypertension;
- to determine the pathogenetic significance of markers characterizing the severity of abdominal obesity - a key component of the metabolic syndrome;
- to investigate the association of the severity of metabolic syndrome with the severity of cardiovascular disorders in patients with hypertension;
- to develop approaches to assessing the effectiveness of therapy for hypertension, based on determining the risk of development and severity of metabolic syndrome.

Main part.

There are several approaches to the classification of hypertension. The identification of 3 stages of hypertension is based on the presence of target organ damage, associated clinical conditions, diabetes mellitus and chronic kidney disease. The stage of hypertension does not depend on the level of blood pressure. There are three stages of hypertension (Table 1).

The degree of hypertension is classified according to the degree, which is determined by the level of blood pressure in untreated patients. The blood pressure category is determined by the highest value of systolic or diastolic blood pressure based on the results of measuring it three times with the patient sitting, using the average values of systolic ("upper") blood pressure and diastolic ("lower") blood pressure determined from the last two measurements.

Based on the level of blood pressure, the presence of a risk factor, target organ damage, and associated clinical conditions, diabetes mellitus is divided into 4 risk categories for the development of cardiovascular complications and death from them in the next 10 years: low (risk 1), moderate (risk 2), high (risk 3) and very high (risk 4) (Table 1). The most significant is the determination of the risk category in patients with hypertension stages I and II [6].

Table 1. Classification of the stages of hypertension depending on blood pressure levels, the presence of cardiovascular risk factors, organ damage caused by hypertension, and the presence of concomitant diseases

GD stage	Other risk factors, TOD or diseases	Blood pressure, mm Hg.			
		High normal SBP 130-139 mm. Hg. DBP 85-89 mm. Hg.	Degree 1 SBP 140-159 mm. Hg. DBP 90-99 mm. Hg.	Grade 2 SBP 160-179 mm. Hg. DBP 100-109 mm. Hg.	Grade 3 SBP ≥180 mm. Hg DBP ≥110 mm Hg.
Stage I	No other risk factors	Low risk (risk 1)	Low risk (risk 1)	Low/moderate risk (risk 2)	High risk (risk 3)
	1-2 RF	Low risk (risk 1)	Low/moderate risk (risk 2)	High risk (risk 3)	High risk (risk 3)
	≥3 RF	Low/moderate risk (risk 2)	High risk (risk 3)	High risk (risk 3)	High risk (risk 3)
Stage II	TOD, CKD stage 3 or DM without organ damage	High risk (risk 3)	High risk (risk 3)	High risk (risk 3)	Very high risk (risk 4)

Stage III	Established CVD, CKD stage ≥4 or DM with organ damage	Very high risk (risk 4)	Very high risk (risk 4)	Very high risk (risk 4)	Very high risk (risk 4)

Note: BP - blood pressure, GD - hypertonic disease, DBP - diastolic blood pressure, TOD - target organ damage, SBP - systolic blood pressure, DM - diabetes mellitus, CVD - cardiovascular diseases, RF - risk factor, CKD - chronic kidney disease.

A risk factor is understood as external or internal, genetic, physiological, behavioral and socio-economic circumstances that contribute to the occurrence and progression of diseases. Numerous studies have identified risk factors for cardiovascular disease.

Risk factors influencing the development of hypertension are divided into non-modifiable, that is, unchangeable, and modifiable, which can be successfully influenced. The first “unmodified” factors include only three factors: gender, age, heredity. The second risk factors – “modifiable” – include smoking, dyslipidemia, increased vascular stiffness, increased glucose levels, abdominal obesity, insufficient consumption of fruits and vegetables, excess alcohol consumption, low physical activity and others.

Smoking is a common modifiable risk factor for the development of hypertension. According to the literature, tobacco use leads to almost 7 million deaths per year.

The lifestyle of a modern person is characterized by physical inactivity, an increased level of psycho-emotional stress, combined with poor nutrition, and the predominance of animal fats and refined carbohydrates in the diet. Overeating has been shown to be a key factor in weight gain [1]. At the same time, some researchers believe that the rise in obesity is largely due to a sedentary lifestyle rather than consuming excessive amounts of calories. Ultimately, we have to admit the fact of the predominance of energy consumption over expenditure, which leads to its accumulation in the form of fat. Interest in the problem of obesity is associated, first of all, with the fact that it is considered as an independent risk factor for cardiovascular, endocrine, cancer and other diseases [7,8]. Obesity increases the risk of developing hypertension and other cardiovascular diseases, as well as type 2 diabetes, leading to a decrease in quality and life expectancy. Overweight and obesity can lead to significant neurohormonal and cardiovascular changes. These changes include activation of the renin-angiotensin-aldosterone system, changes in levels of adipokines and proinflammatory cytokines, and activation of the sympathoadrenal system. Activation of the sympathoadrenal system may contribute to increases in heart rate, sodium retention, circulating blood volume, left ventricular end-diastolic volume, cardiac output, and blood pressure.

In addition, there is a relationship between the development of hypertension and body mass index, moreover, they are associated with the development of coronary heart disease. Hypertension and abdominal obesity are components of a broader complex of risk factors for cardiovascular complications - metabolic syndrome.

Currently, the molecular mechanisms underlying the development and progression of cardiovascular diseases in metabolic syndrome remain an area of active research. There is a connection between the components of metabolic syndrome and the progression of atherosclerosis, which is the leading cause of death from cardiovascular diseases. Hemodynamics in the microvasculature are simultaneously regulated by many internal (myogenic) and external (endothelial, nervous, hormonal, metabolic) mechanisms, which together determine the overall tissue perfusion. Changes in the microvascular bed in obesity and metabolic syndrome lead to an imbalance between oxygen delivery and metabolism in the tissues of many organs, most notably the heart, kidneys, brain and skeletal muscles. In metabolic syndrome, the balance between

coronary blood flow and myocardial metabolism in response to physical activity is significantly disturbed (local metabolic dilatation of blood vessels), this is associated with changes in coronary perfusion blood flow. Decreased coronary flow reserve is a predictor of major adverse cardiovascular events.

Conclusion:

Summarizing the information presented in the literature review, we can summarize that the current direction of the pathophysiology of cardiovascular diseases is the identification of various factors influencing the severity of cardiovascular pathology, the search for non-invasive methods for early diagnosis of patients with the most unfavorable combination of risk factors leading to early manifestation of hypertension. disease and the development of its complications. The accumulation of visceral and ectopic fat in the body is one of the main causes of the development of metabolic disorders considered within the framework of metabolic syndrome. In this regard, metabolic syndrome and its components can be considered key risk factors for the development of cardiovascular and endocrine diseases.

Today, there is a need to create a universal method for stratifying the severity and risk of developing cardiovascular diseases, reflecting the severity of all metabolic disorders and, accordingly, the severity of pathological processes, allowing to adequately assess the effectiveness of therapy at the inpatient and outpatient stages and individualize treatment regimens.

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