

Type 2 Diabetes Mellitus and Arterial Hypertension

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Abstract: Arterial hypertension (AH) is one of the leading problems of cardiology that determine the structure of cardiovascular morbidity and mortality. The prevalence of hypertension among the adult population of Russia is 39.3% for men and 41.1% for women. Increased levels of systolic (SAD) and diastolic (DAD) blood pressure (BP) are associated with a higher risk of cardiovascular events.

Keywords: type 2 diabetes mellitus, arterial hypertension.

Relevance of the topic. In Uzbekistan, the prevalence of diabetes mellitus is about 5%. However, less than half of those suffering from this disease are registered on the dispensary register

The prevalence of type 2 diabetes mellitus (DM 2) has been increasing progressively recently, as well as other diseases associated with obesity. At the same time, there is a low detection rate of new cases of DM. The present study is devoted to the assessment of the prevalence of DM 2 in the Russian population and among patients with arterial hypertension (AH).

Prevention and treatment of diabetes mellitus were discussed at an event organized by the Ministry of Health of Uzbekistan on April 10. As it was noted at the meeting, the wide promotion of physical activity and rational nutrition among the population plays a significant role in the prevention of diabetes mellitus. After all, many diseases are based not only on genetic predisposition, but also on factors such as sedentary behavior and overeating. "Diabetes mellitus affects about 360 million people worldwide," said Professor Said Ismoilov, Director of the Republican Specialized Scientific and Practical Medical Center of Endocrinology under the Ministry of Health of Uzbekistan. - In our country, medical care for patients with this disease is mostly free of charge. Treatment is carried out in accordance with the national standards for diagnosing and treating endocrine diseases, which have been developed and implemented.

According to specialists, the prevalence of diabetes in Uzbekistan is about 5%. However, less than half of them, or 127,252 patients, of whom 1,183 are children and 533 are teenagers, are on the dispensary register. The rest of those suffering from the disease remains undetected.

There are 14 endocrinological dispensaries in the country to provide therapeutic and diagnostic assistance to patients with diabetes. There are 496 endocrinology offices in the field, including 189 for children.

A register of children and adolescents with type 1 diabetes mellitus was first established in 2000. In 2007, a register of all patients with this disease in the country was created. The register database was updated in 2010.

Since 2007, diabetes month has been held annually and International Diabetes Day, on 14 November, during which various events are organized to promote a healthy lifestyle. A popular science magazine entitled "Diabetes in Uzbekistan" is published. The adoption of a national programme on diabetes mellitus or a diabetes law is envisaged in the future.

The diabetic associations of Uzbekistan cooperate closely with the International Diabetes Federation, which has been running the Insulin for life humanitarian aid program in Uzbekistan since 2004 and the Life for child program since 2005, which provides free insulin and syringes to children and adolescents.

In 2011, the Association of Endocrinologists of Uzbekistan received a grant from the World Diabetes Foundation (WDF) for the project "Child Diabetes in Uzbekistan".

In recent years, the prevalence of hypertension among the Russian population has continued to increase, reaching a level of 40-45% in the general population. In rare cases, hypertension is the only disease, but more often there are cases of its combination with a number of other pathologies. But if in a number of other patients such a combination is random, caused by a simple coincidence, then in other cases there is a common pathogenetic processes, the interdependence of emerging changes affecting the prognosis of patients, management tactics and the effectiveness of therapy. Among such combinations, the presence of hypertension in diabetes mellitus (DM) is of the greatest importance. Hypertension is one of the most significant risk factors in the development and progression of diabetic micro- and macroangiopathies. According to epidemiological studies, when combined with diabetes and hypertension, the risk of fatal coronary heart disease increases 3-5 times, stroke — 3-4 times, complete loss of vision — 10-20 times, uremia — 20-25 times, gangrene of the lower extremities — 20 times [9]. According to current estimates, the incidence of diabetes in Russia will increase at least twice in the next 10-20 years. Most patients with diabetes have elevated blood pressure, which is one of the main risk factors for cardiovascular and cerebrovascular diseases. Hypertension, as well as hemodynamic and metabolic disorders typical of this disease, play a sad role in the development and progression of micro- and macrovascular complications of diabetes. Diabetes mellitus (DM) and arterial hypertension (AH) are mutually aggravating diseases that accelerate the damage of target organs such as the heart, kidneys, cerebral and retinal vessels, and major vessels. Hypertension in combination with metabolic disorders inherent in diabetes accelerates the development of coronary heart disease (CHD), heart and kidney failure, brain complications, peripheral vascular diseases, creates an increased risk of complications, disability and premature death in patients.

According to the Framingham study, severe cardiovascular complications with a combination of hypertension and diabetes are observed 5 times more often, the mortality rate from cardiovascular complications is 2.5- 7.2 times higher, and with the appearance of clinical symptoms of nephropathy — 37 times higher than in comparable age groups of the general population. In the system of stratification of cardiovascular risk, the presence of diabetes mellitus in patients with hypertension allows them to be classified as a very high-risk group. In people suffering from diabetes, elevated blood pressure values are observed 2 times more often than in patients with other diagnoses. According to various authors, the frequency of detection of hypertension among patients with DM ranges from 16.5 to 75%. In European countries, the incidence of hypertension is 10-30% in type 1 diabetes, 30-60% in type 2 diabetes, and 20-40% in people with HTG. In Russia, according to the National State Register of Diabetes, the frequency of detection of hypertension in type 2 diabetes is about 80-90%. In patients with DM, the frequency of hypertension is 2 times higher than the general population, amounting to 10-30% in patients with type 1 diabetes, 60-80% in type 2 diabetes and 20-40% in people with HTG [2,5]. In patients with type 1 diabetes, the appearance of hypertension, as a rule, indicates the development of renal insufficiency (PN) and its frequency increases with increasing severity of kidney damage. According to the Endocrinological Research Center of the Russian Academy of Medical Sciences, with an average duration of 10 years, the frequency of hypertension in type 1 diabetes is 10% in people without kidney pathology - normoalbuminuria (NAU), 20% in patients at the stage of microalbuminuria (MAU), 50-70% at the stage of proteinuria (PU) and 70-100% - at the stage of CRF. The higher prevalence of hypertension, even in the initial stage of nephropathy, indicates that in type 2 diabetes, hypertension often precedes a violation of carbohydrate metabolism and in 50% of patients it is detected already at the onset of diabetes. This is due to the fact that the development of hypertension and type 2 diabetes is based on a common metabolic defect - insulin resistance (IR), which clinically can debut with an increase in blood pressure, only later leading to a violation of carbohydrate metabolism. For the first time, the assumption of a single origin of DM (or HTG), hypertension and dyslipidemia, combined with reduced sensitivity of peripheral tissues to insulin, was suggested by G.M. Reaven in. The combination of these pathological changes is called metabolic syndrome or insulin resistance syndrome. Later, the hypothesis of the interrelated origin of

DM and AH was confirmed in many studies, the largest of which is ARIC (The Atherosclerosis Risk in Communities). This study was conducted in the United States and included 12,550 people aged 45 to 64 years without diabetes. After 6 years, the incidence of new cases of type 2 diabetes was assessed. It turned out that in individuals with hypertension (according to the criterion of blood pressure >140/90 mmHg), the frequency of type 2 diabetes de novo was 2.43 times higher than in normotensive patients. The conducted studies confirm the close relationship between the development of type 2 diabetes and hypertension. According to the National State Register of Diabetes, the average incidence of hypertension in type 2 diabetes in Russia is about 80%, but the actual prevalence of hypertension (recorded with its active detection) is approaching 90%.

Diabetes mellitus (DM) is one of the most common chronic diseases and is a serious public health problem, since diabetes has a decrease in the quality of life, early disability and high mortality. In all countries, there is an increase in the incidence of diabetes mellitus. The number of patients with diabetes mellitus is currently approaching 200 million people, with the majority (90%) of patients being patients with type 2 diabetes mellitus. According to forecasts, while maintaining such growth rates by 2010 The number of diabetic patients on the planet will reach 221 million people, and by 2025, more than 300 million people are expected to have diabetes mellitus. Type 2 diabetes mellitus is characterized by the development of severe disabling complications leading to complete disability and premature mortality. According to the Cost of Diabetes in Europe – Type 2 (CODE-2) study, which studied the prevalence of various diabetic complications in patients with diabetes mellitus (the average age of the surveyed was 67 years), 59% of patients had complications, and 23% of the surveyed had 2, and 3% had 3 complications of type 2 diabetes mellitus. Cardiovascular pathology was found in 43%, cerebrovascular pathology in 12% of patients. It was found that with type 2 diabetes mellitus, the risk of developing cardiovascular pathology is 3-4 times higher than in its absence. Patients with type 2 diabetes have the same risk of premature death as patients who have suffered a myocardial infarction without diabetes mellitus. In most developed countries of the world, diabetes mellitus occupies the 3rd-4th place in the overall mortality structure, is the leading cause of blindness and decreased vision in the adult population.

Despite the success of medicine, diabetes mellitus remains one of the priority diseases, the social and medical significance of which is obvious. The main cause of mortality in diabetes mellitus is vascular complications, in the pathogenesis of which the main role belongs to hyperglycemia and its metabolic effects. The risk of macro- and microangiopathy in patients with type 2 diabetes mellitus directly depends on the level of glycemia. An analysis of the results of the United Kingdom Prospective Diabetic Study (UKPDS) showed that an increase in the level of glycated hemoglobin by only 1% increases the risk of diabetes-related mortality by 21%, myocardial infarction by 14%, peripheral vascular diseases by 43%, microvascular complications by 37%, the development of cataracts by 19%. The incidence of any complications of diabetes mellitus, including death of patients, increases in proportion to the average level of glycated hemoglobin HbA1c. Mortality from cardiovascular diseases among patients with type 1 and type 2 diabetes mellitus is 35 and 75%, respectively. Life expectancy in patients with type 2 diabetes mellitus is less, and mortality (taking into account age) is almost twice as high as in patients without this disease.

The high cardiovascular risk in diabetes is due to several circumstances. Firstly, many risk factors for cardiovascular diseases (CVD) are present in patients already at the stage preceding diabetes. As is known, insulin resistance (IR) plays a leading role in the development of type 2 diabetes mellitus. In modern interpretation, insulin resistance should be understood as a primary selective and specific violation of the biological action of insulin, accompanied by a decrease in glucose consumption by tissues (mainly skeletal muscles) and leading to chronic compensatory hyperinsulinemia. In conditions of insulin resistance, there is a decrease in glucose intake into insulin-dependent tissues (muscle, fat), an increase in glucose production by the liver, which contribute to the development of hyperglycemia. With an adequate ability of β -cells to compensate for an increase in glucose levels by excessive insulin production, the state of normoglycemia persists. However, subsequently, with an increase in the severity of insulin resistance, the insulin-secretory ability of β -cells is depleted and they cease to cope

with the increasing glucose load. Initially, this is manifested by the development of hyperglycemia in the postprandial (after eating) period. An example of postprandial hyperglycemia is impaired glucose tolerance. With further progression of impaired insulin secretion by beta cells of the pancreas and persistent insulin resistance, impaired glucose tolerance develops into type 2 diabetes mellitus. It was found that annually impaired glucose tolerance turns into type 2 diabetes mellitus in 4-9% of patients. Thus, macrovascular complications, which are a manifestation of CVD, occur much earlier than the development of the full picture of diabetes. Secondly, factors such as obesity, hypertension and dyslipidemia can also play a decisive role in the development of complications of diabetes mellitus caused by atherosclerosis. Many patients with type 2 diabetes have several risk factors for cardiovascular diseases even before diagnosis, including, in addition to diabetes, hyperlipidemia, arterial hypertension and overweight. Thus, dyslipidemia is detected in every second patient with diabetes mellitus, and almost all patients in this category are overweight. This "polygenic syndrome", which includes hypertriglyceridemia, decreased levels of high-density lipoproteins, abdominal obesity, arterial hypertension (AH), impaired fasting glycemia, was first introduced into scientific use as a separate concept under the names "metabolic trisindrome", "affluence syndrome", and later as "metabolic syndrome". At first, the possible connection between the components of this syndrome was ignored by many, until in 1988 G.M. Reaven et al. No hypothesis has been put forward about insulin resistance as the root cause of the development of the so-called metabolic syndrome. The great interest in the problem of metabolic syndrome in the last decade is explained by its wide distribution in the population factors for cardiovascular diseases, including acute coronary syndrome and stroke. The increase in the total individual cardiovascular risk by several times with a combination of its factors determines the high medical and social significance of the metabolic syndrome. Moreover, at present, the presence of metabolic syndrome is considered as the main cause of high global cardiometabolic risk, combining the risk of CVD and the risk of developing diabetes .

Arterial hypertension is most common in patients with type 2 diabetes mellitus. Thus, the UKPDS study analyzed which cardiovascular diseases patients who were diagnosed with diabetes mellitus for the first time already had. It turned out that arterial hypertension occurred in almost 65% of patients, quite often patients had already suffered a myocardial infarction in the past (34%) or had ECG changes (33%). Peripheral vascular diseases (macroangiopathy) were reported in 46% of patients, and stroke – in 38% of patients.

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