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OVERWEIGHT AS A RISK FACTOR FOR CHRONIC KIDNEY DISEASE AND ITS MODERN APPROACH TO EARLY DIAGNOSIS

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Summary
Obesity is one of actual medico-social problems of modern society. Rapid growth of the persons suffering from excess mass of a body, defines relevance of this problem. Obesity leads to progressive injury of kidneys through a set of mechanisms. Use of early biomarkers of pathology of kidneys at obesity with an assessment of level of indicator of microalbuminuria is perspective for diagnostics of renal defeat at obesity. The purpose of this study is to study the level of impaired renal function with obesity, and to identify its significance as a risk factor in the development of CKD

Keywords: body mass index, obesity, chronic kidney disease, microalbuminuria

Relevance. Involvement of kidneys with many common diseases in the population, including those not initially considered renal, recently attracts close attention of clinicians.

Renal damage in obesity is usually associated with the effect of concomitant metabolic disorders - insulin resistance or type 2 diabetes, hyperuricemia, and hypertension. In connection with this, it is natural to increase the frequency of diabetic nephropathy, hypertensive nephroangiosclerosis and urate nephropathy, described in obese patients.

But obesity can be a risk factor for the development of chronic kidney disease (CKD), regardless of the presence or absence of diabetes mellitus, arterial hypertension and other comorbidities.

In recent years, it has become apparent that in the general population obesity is one of the significant risk factors for impaired renal function. With an increase in BMI by 10%, the likelihood of a reduction in GFR to a level that allows diagnosing chronic kidney disease increases almost 1.3-fold. [2,5]. According to the latest estimates of the

World Health Organization (WHO), over 500 million people in the world are overweight. The prevalence of obesity is becoming an epidemic [3, 4]. This problem has affected all segments of the population, regardless of social and professional background, age, place of residence and sex. In Western Europe, for example, between 10 and 20% of men and 20-25% of women are overweight or obese [4]. In Russia, on average, 30% of people of working age are obese and 25% are overweight [3,4]. There is an increasing prevalence of obesity in children and adolescents [1,5].

Mechanisms of development and progression of the pathological process in the kidneys under the influence of excess body weight are poorly known, and only single, mostly experimental, studies on this field are known [1,4,6]. However, the data accumulated to date make it possible to comprehend the contribution of obesity and accompanying metabolic, hormonal and hemodynamic disorders to the formation of pathological changes in kidney function and structure. The rapid increase in the number of persons suffering from excessive body weight and the steady "rejuvenation" of the population of complete people makes the study of this problem particularly urgent. There is no doubt that obesity predisposes to the formation of violations of lipoprotein metabolism, arterial hypertension, hyperuricemia. The problem of the pathological metabolic consequences of obesity is becoming especially important due to a steady increase in its prevalence, beginning with childhood, both in developed and developing countries.

Diagnosis of early stage of nephropathy associated with obesity includes regular examination of all persons with abdominal obesity for microalbuminuria, which will prevent subsequent deterioration of kidney function.

Nephropathy in patients with very large body weight has now acquired the status of a general population problem.

Obesity causes direct damage to the kidneys, due to the disrupted synthesis of fatty tissue by various cytokines with nephrotoxic action, and mediated by the induction of the development of diabetes mellitus and AH, which are the most significant risk factors for CKD.

The aim of this research is to study the level of impaired renal function with obesity, and to identify its significance as a risk factor in the development of CKD.

Material and Methods

In this prospective cohort study, we evaluated the characteristics of a CKD cohort according to various BMI categories. Subsequently, we investigated the association between BMI and the risk of GFR decline among patients with different CKD stages.

Were included in the study 317 patients (31.2% of men and 68.8% of women). The age of those examined was 17-78 years (mean age 56.2 ± 17.8 years).

The examination included: determination of body mass index (BMI), waist circumference (WC), thigh circumference (TC), WC/HC, lipid spectrum determination (total cholesterol, triglycerides, low and high density lipoprotein level), microalbuminuria by strip test method and calculation glomerular filtration rate (GFR). To assess the functional state of the kidneys, the calculation of GFR is mandatory. The most rational and reliable way to determine GFR is to automatically calculate it in biochemical laboratories, which must produce two results - the serum creatinine concentration and the calculated GFR. We calculated the GFR by the CKD-EPI method, taking into account the level of serum creatinine, race, sex and age of the patient.

All subjects underwent urine analysis with Combina 13 test strips (Human GmbH Germany). These diagnostic test strips are designed to determine the semiquantitative measurement of the concentration of microalbumin (MAU) in the urine. The test for measuring UAS in urine is based on the principle of changing the color of the indicator under the influence of proteins. The level of MAU was determined according to the following scale: up to 10 mg / l norm (NAU), 10-30 mg / l initial increase, 30-80 mg / l average increase, 80-150 mg / l high level. To clarify the probability of UIA, albumin / creatinine ratio (ACR) is determined, ACR is the preferred test for microalbuminuria screening recommended by the American Diabetes Association. ACR is estimated as follows on the scale - Normal- Normal; Abnormal-pathology; High abnormal-severe pathology.

The main diagnostic criterion of obesity is the excess of the total body weight in relation to the established rate. However, the magnitude, which largely determines the severity of the course of the disease, is not so much the mass of the body itself, but an excess of adipose tissue. At present, it is generally accepted to determine the body mass index (BMI), or the Quetelet index, the ratio of body weight expressed in kilograms to the square of growth in meters. This indicator provides fairly accurate information about the fat tissue in the body in individuals aged 20 to 55 years who have a growth close to the average (men - 168-188 cm and women 154-174 cm) [4,6]. BMI is not only a diagnostic criterion for obesity, but also an indicator of the relative risk of developing associated diseases (Table 1).

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Table 1 Classification of obesity by BMI (WHO, 1997)

Types of body mass	BMI (kg / m²)	Risk of concomitant diseases
Deficiency of body weight	<18,5	Low (increased risk of other diseases)
Normal body weight	18,5-24,9	Normal
Excess body weight	25,0-29,9	Increased
Obesity of the I st	30,0-34,9	High
Obesity of the II st	35,0-39,9	Very high
Obesity of the III st	>40	Extremely high

Studies conducted in different countries have shown that the distribution of excess adipose tissue in the body is of particular importance for the development of obesity-related diseases. According to the latest data, the so-called visceral obesity is the most unfavorable. It is the volume of visceral fatty tissue that is independent of the degree of obesity, a risk factor for development of AH, IHD, DM 2 [3-5]. One of the indicators of visceral obesity is the waist circumference (WC): for men, the borderline value is 94 cm, for women - 80 cm. Some authors consider the ratio of the circumference of the waist to the hip circumference (WC / HC) to be more accurate [5] . The value of this ratio is more than 0.95 in men and more than 0.85 in women indicates a pathological deposition of fat in the abdominal region.

The statistical analysis was carried out using the STATISTICA 6.1 for Windows application package. The results are presented as mean values and standard deviation (for normally distributed signs) and median and interquartile interval (for abnormally distributed characteristics). An analysis of the differences between the two groups was performed using the Mann-Whitney U criterion. Statistical significance was established for $p < 0.05$. To identify the relationship between different parameters, a correlation analysis was carried out for Spearman (Spearman)

Results

Based on the results of the definition of BMI, the surveyed are divided into 3 groups. Group 1 - patients with normal body weight. In this group were 113 people, the BMI was 23.2 ± 10.6; 2 group of patients with overweight - 152 people, BMI was 27.6 ± 12.3; Group 3 patients with obesity of varying degrees-52 people, BMI 37.1 ± 7.2. All examined had GFR by CKD-EPI and microalbuminuria in the urine. As is known, microalbuminuria is a marker of primary renal damage, widely used for early diagnosis of CKD. Objective and laboratory data of patients are presented in table 2.

Table 2 Objective and laboratory data of patients in different groups

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Parameters	group I (*n* = 113)	group II (*n* = 152)	group III (*n* = 52)	Values of *P*
Age (years)	39,6 ± 10,63	45,4 ± 12,3	50,9 ± 7,22	> 0,05
Women (number)	80 (70,8%)	117 (76,9%)	21 (40,4%)	> 0,05
BMI (kg / m²)	23,2± 10,6	27,6± 12,3	37,1±7,2	<0,05
Diabetes mellitus (number)	10 (29%)	17 (35%)	20 (36%)	> 0,05
IHD (number)	7 (21%)	11 (22%)	17 (23%)	<0,05
Hypertonic disease	39 (34,5%)	91(59,8%)	27(51,2%)	<0,05
GFR (ml / min / 1.73 m²)	82,6 ± 10,67	69,4 ± 12,3	56,5 ± 7,21	<0,01
MAU =150 mg/l	2 (1,7%)	6 (3,9%)	3 (5,7%)	<0,01
MAU =80 mg/l	16 (14,3%)	38 (25%)	15 (28,8%)	<0,01
MAU=30 mg/l	53 (46,9%)	71 (46,7%)	25 (48,1%)	<0,01
MAU=10 mg/l	42 (37,3%)	37 (24,3%)	9 (17,4%)	<0,01

Our study results were determined the following: weight gain is more common among women than men. In all groups, obesity is associated with diabetes mellitus, cardiovascular pathologies, such as ischemic heart disease and hypertension.

In the statistical processing of data, a positive correlation the relationship between the levels of microalbuminuria and GFR in the total cohort of patients included in the study.

In this case, statistically significant differences in the microalbumin concentration index for different groups show maximum levels (at the upper limit of the defined range) in group II and III patients, while at the same time, remarkably marked elevations of microalbuminuria in patients with excessive body weight, comparing the group of patients with obesity different degrees, respectively, the frequency of occurrence of MAU 150 and 80 mg / l in patients with overweight of 3.9 and 25%, in obese patients 5.7 and 28.8% (p <0.01).

Also, according to the results of GFR levels, it becomes clear that a critical decrease in the function of the glomerulus of the kidney occurs in a group of patients with obesity and overweight.

Conclusion

Thus, considering obesity as one of the most important risk factors for CKD, each patient with excess body weight associated with diabetes mellitus, cardiovascular pathologies, such as coronary heart disease and hypertension (one or more of them), and even a patient with obesity asymptomatic of the other above mentioned pathologies, should be assessed regularly by urinalysis, albuminuria, serum creatinine and GFR as an approach to early diagnostic screening of CKD.

Use of early biomarkers of renal pathology in obesity with the evaluation level indicators microalbuminuria and GFR is promising for diagnosing kidney disease in obesity and overweight.

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