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ЖУРНАЛ ГЕПАТО-ГАСТРОЭНТЕРОЛОГИЧЕСКИХ ИССЛЕДОВАНИЙ

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CARBOHYDRATE AND LIPID METABOLISM AND THEIR RELATIONSHIP WITH MICROALBUMINURIAIN CHILDREN WITH OBESITY

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ANNOTATION

55 overweight and obese children aged 7 to 18 years, as well as 20 children with normal body weight were studied. A comparative study was conducted in groups based on the frequency of observations of pathological indicators of carbohydrate and lipid metabolism in relation to microalbuminuria. A relationship was obtained between the degree of obesity, the severity of carbohydrate metabolism disorders and dyslipidemia in children and the level of microalbuminuria, which was expressed by an increase in cholesterol, triglycerides, LDL and in a decrease in HDL, an increase in immunoreactive insulin and the IR NOMA R index in children with high microalbuminuria and severe obesity.

Keywords: obesity, children, carbohydrate metabolism, lipid metabolism, microalbuminuria.
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УГЛЕВОДНЫЙ И ЛИПИДНЫЙ ОБМЕН И ИХ ВЗАИМОСВЯЗЬ С МИКРОАЛЬБУМИНУРИИ У ДЕТЕЙ С ОЖИРЕНИЕМ

АННОТАЦИЯ

Под наблюдением находились 55 детей с избыточной массой тела и ожирением в возрасте от 7 до 18 лет, а также 20 детей с нормальной массой тела. Сравнительное исследование проводилось в группах на основе частоты наблюдения патологических показателей углеводного и липидного обмена в зависимости от микроальбуминурии. Получена связь между степенью ожирения, выраженностью нарушений углеводного обмена и дислипидемии у детей и уровнем микроальбуминурии, которая выражалась в повышении холестерина, триглицеридов, ЛПНП и снижении ЛПВП, увеличении иммунореактивного инсулина. и индекс IR NOMA R у детей с высокой микроальбуминурией и тяжелым ожирением.

Ключевые слова: ожирение, дети, углеводный обмен, липидный обмен, микроальбуминурия

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СЕМИЗЛИГИ БЎЛГАН БОЛАЛАРДА УГЛЕВОД ВА ЛИПИД АЛМАШИНУВИ БУЗИЛИШИ ВА УЛАРНИНГ МИКРОАЛЬБУМИНУРИЯ БИЛАН БОҒЛИҚЛИГИ

АННОТАЦИЯ

Бизнинг тадқиқотимизда 7 ёшдан 18 ёшгача бўлган 55 нафар ортиқча вазнга эга бўлган ва семизлиги бўлган болалар, шунингдек, нормал тана вазнига эга 20 бола ўрганилди. Микроалбуминурияга нисбатан углевод ва липидлар метаболизмининг патологик кўрсаткичларини кузатиш частотасига асосланган гуруҳларда қиёсий тадқиқот ўтказилди. Болаларда семизлик даражаси, углевод алмашинувининг бузилиши, дислипидемиянинг оғирлик даражаси ва холестерин, триглицеридлар, зичлиги паст липопротеидлар (ЮЗЛП) нинг кўпайиши ва зичлиги юқори липопротеидлар (ПЗЛП) нинг пасайиши билан ифодаланган микроалбуминурия даражаси ўртасида боғлиқлик кузатилди, бу эса семизликнинг юқори даражаси ва микроалбуминурия бўлган болаларда иммунореактив инсулин ва ИР HOMA R индексининг юқори бўлиши билан намоён бўлади.

Калит сўзлар: семизлик, болалар, углевод алмашинуви, липидлар метаболизми, микроалбуминурия.

RELEVANCE OF THE PROBLEM. Overweight and obesity have reached epidemic proportions, affecting almost 60% of adults, with 7.9% of children under 5 years of age suffering from this pathology. At the present stage, the problem of obesity in children and adolescents has become one of the significant problems of medicine. One in three school-age children and one in four children aged 10 to 19 are overweight or obese [1]. Today it is known that obesity is also an independent risk factor for the development of chronic kidney disease (CKD) [2,3], contributing to kidney damage through direct (hemodynamic and hormonal effects of adipose tissue) and indirect (hypertension and type 2 diabetes) mechanisms [4]. Despite this, there is very little literature data on the structural and functional state of the

kidneys based on the results of their comprehensive study using modern instrumental diagnostic methods in adolescent children with obesity. [4,5].

Currently, the importance of obesity as a predisposing factor in the development of tubulointerstitial kidney damage, in which the primary symptom is microalbuminuria, is widely discussed in the literature [6,7]. In this regard, the study of microalbuminuria in obese children and adolescents is of scientific and practical interest and determined the setting of the goals of our study.

PURPOSE OF THE STUDY. To determine the relationship between microalbuminuria and indicators of carbohydrate and lipid metabolism in obese children.

MATERIAL AND METHODS: our research was carried out in family clinics in the city of Samarkand (Uzbekistan). The study involved 55 people aged 7 to 18 years (average age of children 12.03±0.17 years), with overweight and obesity. The control group included 20 practically healthy children with normal body weight and no pathology of the musculoskeletal system. Anthropometric studies were carried out using standard measuring instruments (floor height meter and medical scales). Anthropometric measurements include: height, body weight, waist

and hip circumference. Comparison of the obtained data and assessment of physical development were carried out using the WHO cumulative centile tables of age and gender distribution of height and body weight for children 5-19 years old [1]. Body mass index (BMI) was calculated from the measurements. Outcomes were assessed using BMI standard deviations (SDS) according to WHO recommendations [1].

Obesity in children and adolescents should be defined as +2.0 SDS BMI,

overweight +1.0 to +2.0 SDS BMI, and underweight -1.0 to -2.0 SDS BMI [1] .

Based on anthropometric data and determination of body mass index (BMI, kg/m²) in accordance with gender and age, it was possible to distribute children into 3 groups: Group I 21 children with excess body weight (SDS +1.0 to +2.0), Group II group 18 children with grade I-II obesity (SDS from +2.0 to +3), group III 16 children with BMI within SDS from +3.0 above, which characterized children with grade 3 obesity and above. The control group consisted of 20 children with BMI SDS -1.0 to +1.0. All children included in the study were residents of the Samarkand region.

Microalbuminuria was determined in morning urine by a semi-quantitative method using visual test strips for microalbuminuria MICRAL-TEST II (Mikral-Test 2) Roche Diagnostics. The concentration of glucose in blood serum was determined by the glucose oxidase method.

Cholesterol (CH), high-density blood cholesterol (HDL) was determined using the enzymatic method. Low-density lipoprotein (LDL) and very low-density lipoprotein (VLDL) cholesterol

levels were determined using the Friedwald formulas. The level of immunoreactive insulin (IRI) was determined by enzyme-linked immunosorbent assay (ELISA) with the calculation of HOMAR IR indices using the formulas. Statistical processing of the obtained data was carried out on a personal computer using the Statistica 10 program. Methods of variational parametric and nonparametric statistics were used

to determine the arithmetic mean (M), standard deviation (□), standard error of the mean (m), relative values (frequency, %). The statistical significance of the obtained measurements was determined by Student's test (t) with calculation of the probability of error (P).

RESEARCH RESULTS. As can be seen from the presented data, carbohydrate metabolism disorders occurred in all groups with excess body weight, with a significant frequency in the group with grade 3 obesity.

When conducting a standard glucose tolerance test, carbohydrate metabolism disorders were detected with the highest frequency in the group with grade 3 obesity (62.5%), where there was also an increase in fasting glucose, occurring in 1/3 of the children in this group (37.5%), impaired tolerance was identified to glucose, which indicated the hidden nature of carbohydrate metabolism disorders in children. The data obtained were significant in comparison with children with excess body weight, both in relation to fasting hyperglycemia (p□0.05) and in relation to impaired glucose tolerance (p□0.05), while in comparison with the results of the group of

children with 1 and 2 degrees of obesity, they did not differ. In children with grade 3 obesity, high glycated hemoglobin was also detected (43.7%), while in

some children it was the only lesion in carbohydrate metabolism, which is evidence of a violation of carbohydrate metabolism not detected during the glucose tolerance test. The level of glycated hemoglobin significantly exceeded the values of children in group 1 (p□0.01) and differed from those in group 2 children (p□0.01).

In children with severe obesity, there was a higher frequency of children with high levels of immunoreactive insulin, the level of which did not exceed the reference values, but was an order of magnitude higher compared to the indicators of other sick children. High levels of immunoreactive insulin were found in more than half of the children in group 3 (62.5%), while the HOMA R IR index in 68.7% of cases had values exceeding the threshold value of 3.2, which suggests that despite The level of immunoreactive insulin was within normal limits; in combination with a high level of fasting glucose, insulin resistance developed in this category of patients.

It should be noted that both the frequency of hyperinsulinemia and the frequency of high IR HOMA R index were significantly higher both compared to group 1 (p□0.01, respectively), and compared to the second group with 1 and 2 degrees of obesity (p□0.05, respectively).

Of the most common disorders of lipid metabolism, a decrease in the fraction of high-density lipoprotein cholesterol (HDL-C) was noted; it was found that the most common decrease in this indicator occurred in children with a significant excess of body weight from normal values, observed in almost half of the children in this group of children (62, 5%), with a significant prevalence of incidence compared to children with overweight (p□0.01), and compared to children with a body weight corresponding to 1-2 degrees of obesity (p□0,05).

The second type of pathology in terms of frequency of occurrence was hypertriglyceridemia. Similar to the decrease in the level of HDL-C, the frequency of occurrence of this indicator depended on body weight, most often occurring in group 3 (43.7%), which was significantly higher compared to group 1 (p□0.02) and compared to group 2 (p□0,05).

The frequency of occurrence of total cholesterol and the fraction of low-density lipoprotein cholesterol increased depending on the increase in body weight. At the same time, the level of total cholesterol did not differ significantly in the obese groups, while low-density lipoprotein cholesterol had a significant frequency, significantly exceeding the indicators in children of group 1 (p □0.01), and children of group 2 (p□0.05). Thus, in children of group 3, changes in the lipid profile of the blood serum were more pronounced atherogenic in nature compared to other groups, where statistically significant differences in the disturbance of the lipid fraction were revealed in groups with different body weights.

When analyzing the quantitative values of metabolic parameters characterizing comorbidity in obesity in children and adolescents, in relation to the severity of obesity, data were obtained on a statistically significant increase in the median of all parameters characterizing lipid metabolism with increasing body weight. After determining the presence and level of albumin in the urine of all children of the study groups according to the MAU level, we divided them into two subgroups: 1 subgroup MAU up to 20 mg/l, 2 subgroup MAU >20 mg/l.

First of all, we conducted a comparative study of the level of carbohydrate metabolism indicators; it should be noted that in group 1 there were no statistical dependencies on the level of MAU in the urine and an increase in carbohydrate metabolism indicators. In group 2 there was a statistically significant increase only in blood insulin ($p<0.05$), in group 3 there was a statistically significant difference between insulin levels ($p<0.05$), the IR HOMA R indicator ($p<0.05$) and level of glucose tolerance test ($p<0.05$).

Thus, when comparing triglyceride levels in groups with different levels of daily microalbumin excretion in urine (MAU≤20 mg/l and MAU>20 mg/l in morning urine) in a group of children and overweight,

we obtained statistically significant results in cases of triglyceridemia ($p<0.05$) and high-density lipoprotein cholesterol. ($p<0,05$).In children of the group with grade 1-2 obesity, we obtained significantly significant values between the two subgroups for triglycerides ($p<0.05$), high-density lipoprotein cholesterol ($p<0.05$) and low-density lipoprotein cholesterol ($p<0.05$) , i.e. all indicators tended to increase, and CLPV to decrease

In children with grade 3 obesity, statistically significant growth rates were observed for all indicators of lipid metabolism, depending on the level of MAU (triglycerides ($p<0.01$), high-density lipoprotein cholesterol ($p<0.01$) and low-density lipoprotein cholesterol ($p <0.01$) and total cholesterol ($p<0,01$).

Obesity is often accompanied by changes in the blood lipid spectrum, impaired glucose tolerance and arterial hypertension [6]. Insulin resistance and hyperinsulinemia play a major role in the development of obesity; under their influence, the activity of triglyceride lipase changes, which slows down the catabolism of lipoproteins and leads to hypertriglyceridemia and dyslipidemia [7]. Dyslipidemia is a known risk factor for atherosclerosis and is also common among adults and children with chronic kidney disease.

CONCLUSIONS: Proteinuria and MAU are important factors in kidney damage and, according to recent studies, are increasingly occurring in people suffering from overweight and obesity, even in the absence of diabetes. In this study, a clear relationship was obtained between the degree of obesity and the severity of

carbohydrate metabolism disorders and dyslipidemia in children and adolescents, which was expressed by an increase in the level of cholesterol, triglycerides, LDL and a decrease in HDL, an increase in immunoreactive insulin and an increase in the IR HOMA R index. A distinctive feature was the fact that dyslipidemia in children suffering from overweight and obesity was expressed more in changes in the concentration of HDL and LDL, while in adult patients hypertriglyceridemia was primarily observed.

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