UDK: 616.379-008.64:615,252.349.7-085

NUTRITIONAL-CONSTITUTIONAL OBESITY AND ITS IMPACT ON METABOLIC CHANGES

АЛИМЕНТАРНО-КОНСТИТУЦИОНАЛЬНОЕ ОЖИРЕНИЕ И ЕГО ВЛИЯНИЕ НА МЕТАБОЛИЧЕСКИЕ ИЗМЕНЕНИЯ

АЛИМЕНТАР-КОНСТИТУЦИОНАЛ СЕМИЗЛИК ВА УНИНГ МЕТОБОЛИК ЎЗГАРИШЛАРГА ТАЪСИРИ

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BACKGROUND: alimentary-constitutional obesity due to it's high prevalence, is the key problem of modern healthcare system. However, obesity is not always accompanied with metabolic disorders, leading to early invalidization and mortality. That's why it is important to study risks of metabolical nonhealth in obesity. AIM: to detect factors, increasing risks of development of metabolic disbalance in alimentary-constitutional obesity.

MATERIALS AND METHODS: In patients with alimentary-constitutional obesity there was performed an examination including anthropometry (body mass index, Waist Circumference, Hip Circumference,waist to hip ratio), blood pressure measurement, laboratory tests – metabolic indexes: glucose, insulin, insulin resistance indexes, leptin, cholesterol, cholesterol of lipoproteins, triglycerides, aspartate aminotransferase, alanine aminotransferase, gamma-glutamiltransferase), body composition measurement by bioelectrical impedance analysis; patients were also interviewed on their behavior (food habits) and physical activity.

RESULTS: There were formed two groups depending on metabolic health indexes: main group – metabolically non-healthy obesity (MNHO) - 40 persons (aged 46.5±11.52, duration of obesity 12,5±9,51 years) with alimentary-constitutional obesity and two or more signs of MS, a comparison group – of metabolically healthy obesity (MHO) – 20 persons (aged 44.5±9.03 $p<0,05$, duration of obesity 8,0±7,39 years; $p<0,05$) with alimentary-constitutional obesity and one sign of MS or without it.Data analysis of studied risk factors for development of metabolically non-healthy alimentary-constitutional obesity confirmed that most relevant factor in development of MNHO is abdominal fat mass distribution (increasing of Waist Circumference over 88 sm in females and over 102 sm in mails). At the same time MNHO had correlation not only with classical signs of MS, but also with blood insulin level, insulin resistance indexes, fat metabolism disbalance and liver disfunction. More severed risk for appearance of metabolic disorders have patients over 45 years old with decreased active cell mass (less than 45%), duration of obesity above 10 years and obesity-burdened heredity. In food habits risk of development of metabolically nonhealthy obesity was increased in taking of fat milk food, and, on the contrary, - frequent snacks, alcohol free sweet drinks didn't affect it.

CONCLUSION: Development of MNHO is associated not only with the age of patient, duration of obesity, carbohydrate and fat metabolism indexes, but also with decreased percentage of metabolically active tissues and some food habits.

KEYWORDS: obesity; metabolic syndrome; metabolic disorders; behavior risk factors.

BACKGROUND: To study the factors that lead to metabolic changes in alimentary constitutional obesity using bioimpedance and other examinations.

MATERIALS AND METHODS: Anthropometric examinations (body mass index, waist and hip circumference and their ratio), arterial blood pressure indicators, and laboratory tests (glucose, insulin, HOMA index, total cholesterol, ALT, AST)

using bioimpedance method to assess body composition and physical activity and dietary habits of patients with alimentary constitutional obesity were included in the questionnaires. Insulin resistance (IR) was assessed using the HOMA [(glucose × insulin)/22.5] and Caro index (glucose/insulin). Laboratory tests interpretation reference values: cholesterol in plasma (TC, reference interval 3.2–5.2 mmol/L), low-density lipoproteins (LDL-C, 0.0–3.5 mmol/L), very low-density lipoproteins (VLDL-C, 0.0–0.9 mmol/L), high-density lipoproteins (HDL-C, >1.3 mmol/L), triglycerides (TG, <1.7 mmol/L), plasma leptin (1.1–27.6 ng/mL), plasma glucose (GL, <6.1 mmol/L), and insulin (2.6–24.9 μU/mL). IR indices: HOMA-IR (normal <2.55 units), Caro-IR (normal >0.33 units); AST (up to 45 U/L), ALT (up to 40 U/L). The diagnostic criteria for Metabolic Syndrome (MS) are based on NCEP ATP III (2001): abdominal obesity: (women >88 cm, men >102 cm); TG >1.7 mmol/L, HDL-C: women <1.3 mmol/L, men <1.04 mmol/L; BP ≥130/85 mm Hg, fasting glucose ≥6.1 mmol/L. For MS, at least one criterion or no criteria are needed according to NCEP ATP III (2001). For Metabolic Syndrome, two or more criteria are required. Body composition was assessed using the bioimpedance Mi Body Composition Scale 2 smart scale. This examination measured fat mass (FM, kg, %), total body water (TBW, L), total water (TW, L, %), intracellular water (ICW, L), intracellular water (ICW, L), fat-free mass (FFM, kg, %), active cell mass (ACM, kg, %), and dry cell mass (DCM, kg, %).

RESULTS: The 60 patients were divided into two groups based on the presence or absence of metabolic changes: the main group – metabolic unhealthy obesity (MUO) – consisting of 40 patients, including 20 women and 20 men, with an average age of 46.5±11.52, an average of 12.5±9.51 years of observed alimentary-constitutional obesity, and 2 or more metabolic changes; the comparison group – metabolic healthy obesity (MHO) – consisting of 20 patients, including 12 women and 8 men, with an average age of 44.5±9.03, an average of 8.0±7.39 years of observed alimentary-constitutional obesity, and only 1 or no metabolic changes. The analysis showed that abdominal obesity has a significant impact on the development

of metabolic changes in alimentary-constitutional obesity (waist circumference: 88 cm in women and 102 cm in men). MUO was not only associated with the classic MS (metabolic syndrome) signs, but also with additional factors, including the insulin level in the blood, HOMA index, lipid profile, liver functional status, and bioimpedance analysis. Metabolic changes were found to be hereditary and were mostly observed in patients over 45 years old with more than 10 years of obesity, where the percentage of active cells in the body dropped below 45%. In contrast, patients with a diet rich in fats, dairy, sweets, and those who frequently indulge in overeating showed fewer metabolic changes.

Table 1. Clinical and laboratory examination results of obese patients based on their metabolic health (M±σ).

Indicator	MUO n=40	MHO n=20	P
BMI, kg/м2	36,2±6,66	30,8±4,56	p<0,0001
WC, cm	106,1±15,52	92,2±10,49	p<0,0001
WS/HS	0,87±0,10	0,81±0,08	p<0,0001
SAD, mm. Hg	132,2±16,75	114,4±11,37	p<0,0001
DAD, mm Hg.	85,5±10,61	75,6±7,83	p<0,009
Glucose mmol/l	5,5±1,12	4,9±0,48	p<0,0001
Insulin, мкЕД/ml	17,1±11,07	9,82±4,31	p<0,0001
HOMA-IR, ed	4,26±3,230	2,12±0,970	p<0,0004
Caro-IR, ed	0,44±0,27	0,59±0,25	p<0,0003
TG, mmol/l	1,67±0,94	1,00±0,41	p<0,0001

XS, mmol/l	5,6±1,17	5,2±1,14	p<0,001
XS LPNP, mmol/l	3,68±1,11	3,2±1,24	p<0,005
XS LPONP, mmol/l	0,83±0,55	0,57±0,25	p<0,005
XS LPVP, mmol/l	1,24±0,31	1,49±0,38	p<0,0001
AST, ME/l	26,1±18,58	20,5±7,69	p<0,02
ALT, ME/l	31,7±35,24	31,7±35,24	p<0,02

CONCLUSION: Thus, the occurrence of metabolic changes in obese patients is not only related to age, gender, and carbohydrate and lipid metabolism, but also associated with a decrease in the proportion of active tissue in the body and the composition of the diet. In metabolic unhealthy obesity, abdominal obesity (waist circumference >88 cm in women, >102 cm in men) was once again confirmed. Furthermore, changes were detected in the blood sugar level, insulin and HOMA index, triglyceride levels, lipid profile, and liver functions. Regarding body composition, the lower the proportion of active cells (below 45%), the more frequently metabolic changes were observed.

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