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CLINICAL AND METABOLIC CHARACTERISTICS OF METABOLIC SYNDROME IN INDIVIDUALS WITH EXCESS BODY WEIGHT AND OBESITY

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Abstract: This study assessed the clinical and metabolic characteristics of metabolic syndrome in individuals with excess body weight and obesity. The study included 34 men and 77 women aged approximately 39 years who were examined for anthropometric and biochemical parameters. Increasing body mass index was accompanied by greater total body fat, higher waist-to-hip ratio, and increased abdominal fat accumulation. Men demonstrated more frequent abdominal obesity, dyslipidemia, and fatty liver, while women showed a gradual increase in metabolic abnormalities with increasing body mass index. The findings indicate that metabolic syndrome develops through different combinations of metabolic components and requires early identification and correction of excessive body weight and obesity.

Keywords: metabolic syndrome; obesity; excess body weight; abdominal obesity; dyslipidemia.

КЛИНИКО-МЕТАБОЛИЧЕСКИЕ ОСОБЕННОСТИ МЕТАБОЛИЧЕСКОГО СИНДРОМА У ЛИЦ С ИЗБЫТОЧНОЙ МАССОЙ ТЕЛА И ОЖИРЕНИЕМ

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Аннотация: В исследовании изучены клиничко-метаболические особенности метаболического синдрома у лиц с избыточной массой тела и ожирением. Обследованы 34 мужчин и 77 женщины в возрасте около 39 лет с оценкой

антропометрических и биохимических показателей. С увеличением индекса массы тела возрастали содержание общего жира, отношение окружности талии к окружности бедер и выраженность абдоминального жираотложения. У мужчин чаще выявлялись абдоминальное ожирение, дислипидемия и жировой гепатоз, тогда как у женщин с увеличением индекса массы тела постепенно возрастала частота метаболических нарушений. Полученные результаты показывают необходимость раннего выявления компонентов метаболического синдрома и своевременной коррекции избыточной массы тела и ожирения.

Ключевые слова: метаболический синдром; ожирение; избыточная масса тела; абдоминальное ожирение; дислипидемия.

Introduction: Metabolic syndrome is a multifactorial condition in which excess adiposity is accompanied by disturbances of carbohydrate and lipid metabolism, elevated blood pressure, and changes in fat distribution. Its clinical significance is determined not only by body weight but also by visceral adipose accumulation and the number of associated metabolic abnormalities. Excess body weight and obesity therefore require evaluation using anthropometric and biochemical parameters rather than body mass index alone. Waist-to-hip ratio provides information about abdominal fat distribution, while glucose, triglycerides, high-density lipoprotein cholesterol, and liver enzymes characterize metabolic consequences. In the source investigation, 68 men and 154 women of comparable age were examined in a therapeutic clinic for weight reduction. Participants were categorized according to body mass index into excess weight, first-degree obesity, and second- or third-degree obesity. Increasing body mass index was associated with greater total body fat and changes in waist-to-hip ratio. Metabolic syndrome components differed across body mass categories. Abdominal obesity, dyslipidemia, hypertension, fatty liver, and impaired carbohydrate metabolism were evaluated. Determining these patterns may help identify individuals with greater metabolic burden before complications develop. Early recognition of unfavorable anthropometric and biochemical changes can support individualized weight-management strategies and

reduce future cardiometabolic risk. Therefore, assessment of body composition and biochemical parameters remains relevant for early risk identification.

Aim of the study: To evaluate the clinical and metabolic characteristics of metabolic syndrome in individuals with excess body weight and obesity and to determine the relationship between increasing body mass index and the distribution of major metabolic abnormalities.

Materials and methods. The investigation included 111 individuals with excess body weight or obesity: 34 men and 77 women admitted to a therapeutic clinic for weight reduction. Mean age was comparable, 39.4 ± 1.3 years in men and 39.2 ± 0.9 years in women. Anthropometric assessment included body weight, height, waist circumference, hip circumference, and skin-fold thickness. Measurements were recorded with accuracy of 0.5 cm for linear dimensions and circumferences, 1 mm for skin folds, and 0.1 kg for body weight. Body fat percentage was determined by bioimpedance using an OMRON device. Body mass index was calculated as weight in kilograms divided by height in meters squared. Participants were classified as excess weight (BMI 25–29.9 kg/m²), first-degree obesity (30–34.9 kg/m²), or second- and third-degree obesity (>35 kg/m²). Fat distribution was assessed using waist-to-hip ratio; abdominal obesity was defined as ≥ 0.9 in men and ≥ 0.85 in women. Biochemical assessment included fasting glucose, aspartate aminotransferase, alanine aminotransferase, total cholesterol, high-density lipoprotein cholesterol, and triglycerides. Measurements used enzymatic methods on a Photometer 5010 analyzer. Fatty liver was identified by ultrasound and biochemical assessment. Metabolic syndrome components included abdominal obesity, dyslipidemia, arterial hypertension, and impaired carbohydrate metabolism. Statistical analysis used Statistica 6.0, with analysis of variance, Student's t-test, chi-square, and Mann–Whitney tests as appropriate. The same assessment framework was applied to characterize relationships between increasing body mass index and metabolic syndrome manifestations in both groups across all BMI categories and both sexes.

Results. Increasing body mass index was accompanied by accumulation of body fat in both sexes. Among women, BMI increased from 27.14 ± 0.18 kg/m² in the excess-weight group to 32.45 ± 0.16 kg/m² with first-degree obesity and 40.7 ± 0.79 kg/m² with second- or third-degree obesity. Body-fat percentages were $33.35 \pm 0.41\%$, $39.04 \pm 0.35\%$, and $44.07 \pm 0.60\%$, respectively, with significant differences at $p < 0.01$. In men, BMI values were 28.73 ± 0.33 , 32.64 ± 0.29 , and 41.1 ± 0.95 kg/m², while body-fat percentages were $24.27 \pm 1.23\%$, $29.35 \pm 0.68\%$, and $35.5 \pm 0.7\%$. Waist-to-hip ratio reached 1.00 ± 0.01 in men with advanced obesity and 0.85 ± 0.01 in women. Abdominal obesity occurred in 13%, 35%, and 48% of women versus 70%, 78%, and 89% of men across BMI categories. Dyslipidemia occurred in 18%, 14%, and 38% of women and 40%, 52%, and 79% of men. Hypertension increased from 7% to 16% and 43% among women and from 20% to 30% and 49% among men. Fatty liver was detected in 3%, 8%, and 29% of women and 30%, 30%, and 40% of men. Men had higher fasting glucose in the highest BMI category, higher ALT, higher triglycerides, and lower HDL cholesterol. In women, increasing BMI was associated with higher fasting glucose, ALT, and triglycerides and lower HDL cholesterol. Three to four metabolic syndrome criteria occurred in 40% of men with advanced obesity, whereas women more commonly had zero or one criterion. Hypercholesterolemia remained frequent across BMI categories and showed no consistent statistical dependence on obesity severity. Notably.

Conclusions: Excess body weight and obesity were associated with progressive accumulation of total and abdominal adipose tissue and a greater number of metabolic abnormalities. The highest BMI categories demonstrated unfavorable changes in glucose, triglycerides, HDL cholesterol, and liver enzymes, together with increased frequencies of hypertension, dyslipidemia, abdominal obesity, and fatty liver. Abdominal obesity and dyslipidemia were particularly frequent among men, while women showed a gradual increase in several abnormalities as BMI increased. Three to four metabolic syndrome criteria were present in 40% of men

with second- or third-degree obesity. These findings support early anthropometric and biochemical screening and timely weight-management interventions.

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