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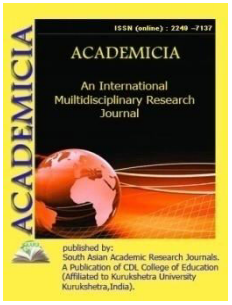

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ASSESSMENT OF THE METHODS OF THE STATE OF HYPERGLYCEMIA AT DIFFERENT BODY MASSES

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ABSTRACT

Abdominal obesity (and the closely related metabolic syndrome) is one of the most common diseases in the world. The urgency of the problem of the progression of abdominal obesity lies not only in its widespread prevalence, but also in the formation of a high risk of developing cardiovascular diseases and type 2 diabetes mellitus. The main reasons for the rapid development of obesity are considered high-calorie nutrition (which includes not only the quantity, but also the quality of food eaten), a sedentary lifestyle and a genetic predisposition. Until now, there has been a heated debate about methods for fast and high-quality weight loss.

KEYWORDS: *Metabolic Syndrome, Obesity, Diet.*

INTRODUCTION

Obesity is one of the most serious medical, social and economic problems of modern society. Over the past 40 years, there has been an increase in the number of people with overweight and obesity [1-3]. SinghG.K. et al., analyzing the data for 1976–2008, showed that in the adult (≥18 years old) American population, the prevalence of overweight increased from 36.9 to 62%, obesity - from 8.7 to 27.4% [1]. A. Berghöfer et al. published a systematic review of the prevalence of obesity in Europe in 2008, summarizing data from the end of 1980 to 2005. in women in Portugal, Poland, Czech Republic, Romania and Albania. The population of Eastern Europe and the Mediterranean countries had higher rates of obesity than in the countries of Western and Northern Europe [4].

More than 1.9 billion adults are overweight, according to the World Health Organization (WHO). Of these, over 600 million people are obese. Over the past decade, the number of obese patients has increased by 75%. It is expected that by 2030 in Europe, 73% of men and 63% of women will suffer from obesity. With regard to the problem of overweight and obesity,

screening programs among children and adolescents are being actively implemented to try to solve this problem at the population level in many countries of the world (O'Connor EA., 2017, An Pediatr (Barc). 2019). [5].

It is known that overweight and obese people have a higher risk of developing metabolic syndrome, dyslipidemia, diabetes mellitus (DM), arterial hypertension, coronary heart disease, cerebral stroke, and cancer [6–9]. Findings from epidemiological studies have repeatedly confirmed a strong positive association between obesity and the risk of developing type 2 diabetes (T2DM). In the United States of America, an adult has a 9% increased risk of diabetes for every kilogram of weight gain [10]. Another study by Koh - Banerjeee P. et al. in the United States, it has been shown that in men, an increase in body weight per kilogram leads to an increase in the risk of diabetes by 7.3% [11].

Currently, there are 3 groups of diagnostic criteria for MS: the WHO criteria, the criteria recommended by the Adult Treatment Panel III (ATPIII), and the criteria of the American Association of Clinical Endocrinologists. These MS criteria combine the presence of arterial hypertension (AH), hypertriglyceridemia, and a decrease in the level of high-density lipoprotein (HDL) cholesterol. According to the WHO criteria, for the diagnosis of MS, laboratory confirmation of insulin resistance is required, while according to the ATP III recommendations, obesity is mandatory (Dedov I.I. 2016).

The key link in the pathogenesis of MS is primary insulin resistance and compensatory hyperinsulinemia.

Insulin resistance - a decrease in the biological effects of endogenous or exogenous insulin - occurs in 58% of people with hypertension, 84% with hyper-triglyceridemia, 84% with type 2 diabetes. When type 2 diabetes is combined (or impaired glucose tolerance (IGT) with dyslipidemia, hyperuricemia and hypertension - the main components of MS, the detection rate of insulin resistance is 95% .This indicates that insulin resistance is indeed the leading mechanism of MS development (Schwartz V.A., 2015)

Purpose of the study. Evaluation of the methodology for the state of hyperglycemia at various body weights

Materials and research methods

703 patients were examined in Bukhara, who underwent examination according to the program providing for the identification of the main components of MS. At the same time, the work used materials from a population study of 400 residents of Bukhara and 700 men of 20-69 years old in Tashkent.

During the survey, the following research methods were used: - a standard questionnaire developed for this study. Instrumental methods included: - ECG at rest in 12 conventional leads. Measurement of blood pressure by the Korotkov method. When assessing blood pressure (BP), the average values of 2 measurements taken with an interval of at least 2 minutes will be taken into account.

Overweight, according to the recommendations of the International Group on Obesity (1997), is fixed at the Quetelet index calculated by the formula: weight (kg) / height (m) ^{2}, ≥ 25, and IC levels ≥ 30 are taken as obesity. At the same time, in population studies for BMI it is

recommended to take IC values> 29 (Rose G. A., Blackburn H., 1968). The BMI criteria were taken as CI ≥ 30, since this CI level differs little from the BMI criteria recommended for population studies and, at the same time, meets the criteria for obesity recommended by the International Group on Obesity.

The state of glucose tolerance was assessed on the basis of the indicators of the standard glucose tolerance test (FGTT) with the determination of fasting glycemia, as well as 1 and 2 hours after taking the subjects 75 g. glucose. Assessment of glycemic parameters was carried out according to the Methodological Recommendations of the Russian Scientific Center of Endocrinology, taking into account the recommendations of WHO experts (1999). In accordance with these recommendations, the evaluation of the data obtained was carried out according to the following criteria (in mg%): normal glucose tolerance: at the level of fasting glycemia <100, 1 hour after glucose load <160 and 2 hours after <100; impaired glucose tolerance: fasting glycemia <100; 1 hour after glucose load> 160 and / or after 2 hours> 100; diabetes mellitus: fasting glycemia> 100, 1 hour after glucose load> 180, 2 hours> 130.

Research results

Obesity is a chronic multifactorial heterogeneous disease manifested by excessive formation of adipose tissue, progressing in the natural course, as a rule, having a high cardiometabolic risk, specific complications and associated concomitant diseases.

Currently, there are different classifications of obesity [20]. The proposed classification makes it possible to stratify patients according to the risk of complications of obesity, cardiometabolic risk using simple methods of anthropometric and clinical examination, to assess the metabolic phenotype of obesity and the effectiveness of the treatment, as a result of which the stage of the disease may change.

Many metabolic and hemodynamic disorders, as well as the pathology of many organs and systems, are often associated with obesity. Currently, there is no clear position, whether these conditions are its complication or they represent concomitant diseases, the onset and progression of which is aggravated by the presence of obesity. Complications and diseases associated with obesity include:

• impaired glucose tolerance (IGT), impaired fasting glycemia (IGN), or a combination of both (any of the three positions characterizes the state of prediabetes)

• type 2 diabetes mellitus

• Arterial hypertension

• hypertriglyceridemia / dyslipidemia

• Obstructive sleep apnea syndrome (OSAS)

• Non-alcoholic fatty liver disease (NAFLD)

• Polycystic ovary syndrome (PCOS)

• Osteoarthritis

• stress urinary incontinence

• gastro esophageal reflux disease (GERD)

• Limitation of mobility and social adaptation

• psycho emotional disorders and / or stigmatization

Obesity and disorders of carbohydrate metabolism

Disorders of carbohydrate metabolism occur in at least half of obese patients. AO and obesity in general are important RFs for the development of not only CVD, but primarily type 2 diabetes. Parameters such as OT and BMI are important components of the scale for predicting the risk of developing diabetes. At the same time, the annual conversion of impaired glucose tolerance to diabetes mellitus is observed in 5-10% of patients and in 20-34% over 5 years, and with a combination of fasting glycemia (> 5 mmol / L) and impaired glucose tolerance - in 38–65%. The likelihood of the transition of impaired glucose tolerance to diabetes mellitus is significantly higher in overweight individuals. The likelihood of developing type 2 diabetes mellitus is also determined by the duration of obesity and the characteristics of the deposition of adipose tissue in the body. Therefore, in obese patients, it is necessary to be examined for the detection of disorders of carbohydrate metabolism and type 2 diabetes (Table 2). Regular screening is carried out with a frequency of at least 1 time in 3 years - in case of a negative result, or more often - at the decision of the doctor (depending on the results of the previous examination and the number of risk factors).

TABLE 1 DIAGNOSTIC CRITERIA FOR DISORDERS OF CARBOHYDRATE METABOLISM AND DIABETES MELLITUS (WHO 1999–2013)

	Glucose concentration, mmol / l	
	Capillary whole blood	Venous plasma
Rule		
On an empty stomach and 2 hours after FGTT	< 5,6	< 6,1
	< 7,8	< 7,8
DIABETES		
On an empty stomach or	≥ 6,1	≥ 7,0
2 hours after FGTT	≥ 11,1	≥ 11,1
Random definition	≥ 11,1	≥ 11,1
Random definition		
On an empty stomach (if determined) and 2 hours after FGTT	< 6,1	< 7,0
	≥7,8 and <11,1	≥7,8 and <11,1
IMPACTED GLYCEMIA STOMACH		
On an empty stomach and 2 hours after FGTT	≥ 5,6 and < 6,1	≥ 6,1 and < 7,0
	< 7,8	< 7,8

In addition to being over 45 years of age, additional risk factors for developing type 2 diabetes are: the presence of first-degree relatives with diabetes;

- Sedentary lifestyle;

- Women who have given birth to a child weighing more than 4 kg, or have had gestational diabetes;

- The presence of arterial hypertension;

- HDL level <0.9 mmol /l and / or TG level > 2.82 mmol / L;

- Polycystic ovary syndrome;

- History of NTG or NGN;

- Clinical manifestations associated with insulin resistance (for example, acantosisnigricans).

Analyzes the incidence of BMI and obesity among individuals with different categories of hyperglycemia. As it turned out (Table 3), in all categories of hyperglycemia, there is a higher incidence of BMI and obesity.

TABLE 3 FREQUENCY OF OVERWEIGHT (BMI) AND OBESITY AMONG INDIVIDUALS WITH VARIOUS CATEGORIES OF HYPERGLYCEMIA

Percentage frequency				
	Normal weight	BMI	Obesity	BMI + Obesity
No hyperglycemia	72,23	22,54	5,23	27,77
Hyperglycemia On an empty stomach	42,31	30,77 *	26,92 *	57,69 **
After 1 hour	42,77	32,70 *	24,53 **	57,23 ***
After 2 hour	17,91	26,87 *	55,22 ***	82,09 ***
Diabetes	19,51	26,83 *	53,66 **	80,49 ***

Note: The table shows the reliability of the differences in indicators relative to the group without hyperglycemia.

It was revealed that the frequency of BMI in patients with hyperglycemia 1 hour after glucose loading was higher than in those with impaired glycemia 2 hours after glucose loading and in patients with diabetes. Moreover, the frequency of BMI in patients with diabetes was slightly lower than in those with fasting hyperglycemia.This fact can be explained by the fact that obesity is more developed in patients with diabetes and its frequency is 2 times higher than in patients with fasting hyperglycemia and after 1 hour after glucose load In general, overweight (BMI + obesity) is 2 times more common among people with fasting hyperglycemia and 1 hour after glucose load (57.69% and 57.23%, respectively) than with normal glycemic levels (27.77%). The highest incidence of overweight (BMI + obesity) occurs with hyperglycemia 2 hours after glucose load and with diabetes mellitus (82.09% and 80.49). These data indicate that a violation of the sympathoadrenal phase of the glycemic curve is also important in in relation to the incidence of overweight (BMI + obesity). Somewhat lower indicators of the frequency of overweight (BMI + obesity) in patients with diabetes in relation to the group of people with hyperglycemia 2 hours after exercise can be explained by the fact that patients with diabetes mellitus are registered and take certain measures to control weight.

Currently, when assessing body weight, it is customary to consider such an indicator as abdominal obesity (AO). According to the data obtained, AO is the least common in patients with normal glucose tolerance (32.74%). With fasting hyperglycemia, the frequency of AO is 1.8 times higher (42.31%), and with impaired glycemia 1 hour after glucose loading, it is 2.2 times higher (50.94%) than with normal glycemic levels. the frequency of AO occurs in patients with diabetes (80.49%) and in the group of persons with impaired glycemia 2 hours after glucose load (74.63%). It should be noted that the differences in all indicators of the frequency of AO in the groups with different categories of hyperglycemia had statistically significant differences from the indicator of the frequency of AO in the group of persons with normal glucose tolerance.

CONCLUSION

1. In the studied population, various categories of hyperglycemia are widespread. Along with such generally recognized categories of hyperglycemia as diabetes mellitus, diabetes, and hyperglycemia 2 hours after glucose load, hyperglycemia is also quite common 1 hour after glucose load.

2. The study of hyperglycemia 1 hour after glucose loading is important, because this category of hyperglycemia, on the one hand, is widespread in the population, and on the other hand, it can transform into hyperglycemia 2 hours after exercise and into diabetes mellitus.

3. For all categories of hyperglycemia, there is a higher incidence, BMI, obesity, including abdominal obesity. These components are more associated with post-load hyperglycemia, including impairment of the sympathoadrenal phase of the glycemic curve.

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