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Obesity in the Context of Evolutionary Development. Modern Methods Of Diagnostics And Treatment.

Sherov Umar Nurilloyevich

Department of Internal Medicine and Endocrinology Bukhara State Medical Institute named after Abu Ali ibn Sina.

Summary. Obesityrepresents a major public health problem due to its high prevalence, rising treatment costs, and adverse outcomes. Despite the fact that obesity has accompanied humanity since the advent of man, it was recognized as a disease with certain pathophysiological consequences about 100 years ago [1–3]. Obesity as a term does not appear until the 17th century and is then only seen in the literature to describe excessive obesity [4]. The impact of obesity on quality of life began to be assessed in the 18th century, in the mid-19th century it was recognized as a cause of poor health, and in the first decades of the 20th century its complications and association with increased mortality were documented [1–3, 5]. The current exponential increase in incidence and accumulating scientific evidence has prompted the World Health Organization to declare obesity a global pandemic and a worldwide public health crisis [6 , 7].

Keywords: coronavirus; COVID-19; diabetes; angiotensin converting enzyme type 2; glucocorticoids.

According to WHO data, in 2009, about 2.1 billion people in the world were overweight or obese, while in Russia among people with this diagnosis, 51.7% were women and 46.5% were men. By 2016, this figure had increased and was already 57% (and that's more than 82 million people!).According to 2017 data, one in two adults and one in six children are overweight or obese. The United States leads in obesity rates - 38.2% of the population have this diagnosis; This figure is lowest in Japan - 3.7%. According to the study, women with a lower level of education are 2-3 times more likely to be obese compared to more educated representatives of the fairer sex.[1] According to etiology, they are distinguished: alimentary-constitutional (primary)accounts for 90-95% of all cases, is a consequence of lifestyle - reduced physical activity, consumption of fatty, high-calorie

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foods, foods high in sugar and refined carbohydrates. Endocrine obesity (secondary) - its cause can be endocrine pathology (decreased thyroid function, hypogonadism, "empty" sella syndrome, pituitary tumors, Cushing's syndrome, etc.), genetic defects in the structures regulating fat metabolism, mental illness. Lifestyle also plays a significant role in the pathogenesis of secondary obesity.[2]This group also includes hypothalamic obesity, associated with the presence and treatment of hypothalamic tumors. Causes of obesity in children Obesity in children develops due to a genetic predisposition in combination with perinatal, environmental, psychosocial and dietary factors. However, the main reason for obesity is that a child consumes more calories than he expends in energy. Symptoms of obesity The main complaint of patients is being overweight. Other complaints include: shortness of breath during exercise, increased blood pressure, dry mouth, menstrual irregularities in women, loud snoring during sleep, increased daytime sleepiness, joint pain, decreased potency in men, etc.

Paeogenesis: Hereditary factors (25-70%);

1. Excessive consumption of fatty and high-calorie foods, sugar, refined carbohydrates, alcohol, mainly in the evening;

2. Eating disorder, which is determined by family and national eating stereotypes. Mental activity and eating habits are closely interrelated, so there is an assumption that one of the causes of obesity is a violation of serotonin metabolism and endorphin reception. Thus, food (especially carbohydrate-rich food) is a kind of "doping", so a parallel can be drawn between obesity (like psychological addiction) and drug addiction or alcoholism. Seeing eating as a means of calming stress in stressful situations, many people exhibit a hyperphagic stress response.

3. Low physical activity. As a result of a sedentary lifestyle, lack of regular physical activity (especially aerobic exercise - walking at a moderate pace for 30–40 minutes 3–4 times a week, running, cycling, swimming, etc.), the body's energy costs are reduced, and combined with a high-calorie diet, all this contributes to excess weight gain;

4. Insulin resistance plays a critical role in the development of obesity and metabolic syndrome, causing obesity and type 2 diabetes. Insulin is a hormone that ensures normal metabolism and maintenance of energy balance by inhibiting the production of glucose by the liver and enhancing its absorption by muscle and fat tissue.

Classification and stages of obesity development

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Today, the WHO classification is used, which is calculated according to the Body Mass Index (BMI) (weight in kg/height m2). According to this classification, normal body weight corresponds to a BMI of 18.5–24.9; overweight - BMI 25–29.9; 1st degree obesity corresponds to a BMI of 30-34.9; Class 2 obesity corresponds to a BMI of 35-39.9; obesity 3rd degree (morbid) – with a BMI above 40. There are 2 main types - android (apple type, usually observed in men - fat deposition mainly in the upper abdomen) and gynoid (pear type, observed in women - fat deposition in the hips and lower part abdomen). Fat deposition of the "apple" type is less favorable, since with this type of obesity visceral obesity (fat deposits around the internal organs) is more often observed, which increases the risk of concomitant diseases. A sign of visceral obesity is considered to be a waist circumference of more than 80 cm in women and more than 94 cm in men. Also, the ratio of waist to hip volume should normally be no more than 1.0 in men and 0.85 in women. Recently, the term "sarcopenic obesity" has been used - it is accompanied by a loss of muscle mass and muscle strength; it can often be found in older people. Loss of muscle mass in combination with obesity is fraught with the development of type 2 diabetes mellitus, cardiovascular diseases, a decrease in the patient's quality of life and disability.[6]

Complications of obesity: Obesity is one of the significant factors that contribute to the development of metabolic syndrome. Its signs: visceral obesity; disorders of carbohydrate and lipid metabolism; arterial hypertension. Metabolic syndrome is often accompanied by: cardiovascular diseases; diabetes; non-alcoholic fatty liver disease (NAFLD); cholelithiasis; polycystic ovary syndrome; obstructive sleep apnea syndrome; joint diseases (osteoarthritis, gout); increased risk of developing cancer (for example, studies have found a connection between metabolic syndrome and insulin resistance with prostate cancer).[7][8]

Non-alcoholic fatty liver disease (NAFLD)is one of the most common liver diseases, closely associated with insulin resistance and metabolic syndrome.[9]It is individuals with metabolic syndrome who have the highest risk of developing NAFLD. According to various studies, the incidence of NAFLD in patients with type 2 diabetes mellitus and obesity ranges from 70 to 100%. Insulin resistance leads to the accumulation of triglycerides in the liver and the formation of fatty hepatosis, which (if left untreated) gradually progresses to fibrosis and then to cirrhosis of the liver.[10]At the theatosis stage, the disease is asymptomatic; at the steatohepatitis stage, an increase in liver enzymes is observed. Steatosis and fibrosis are reversible stages of liver disease, so it is extremely important to detect the disease at an early stage in order to prevent the development of an

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irreversible condition - cirrhosis. Obese patients often have obstructive sleep apnea (OSA), a condition in which the airways partially or completely collapse during sleep. It is characterized by loud snoring during sleep, episodes of respiratory arrest during sleep, and severe daytime sleepiness. This condition disrupts the sleep process, leads to fatigue, severe daytime sleepiness, memory problems, decreased performance (falling asleep at work), increases the risk of cardiovascular complications, and also, due to low blood oxygen saturation, slows down metabolism and prevents the patient from losing weight with obesity. The screening method for diagnosing OSA is overnight pulse oximetry (a non-invasive method for measuring % blood oxygen saturation). If there is a significant decrease in blood oxygen saturation according to pulse oximetry, polysomnography is indicated.[eleven]Using this method, various physiological signals of the human body are continuously recorded: electrical activity of the brain, heart activity, breathing pattern (presence or absence of episodes of respiratory arrest), degree of blood oxygen saturation.

Diagnostics:obesity is based on calculating BMI to determine the severity of obesity. In addition, it is recommended to conduct bioimpedance analysis of body composition to exclude obesity with normal body weight and sarcopenic obesity. Next, it is necessary to exclude secondary forms of obesity and identify diseases associated with obesity (obstructive sleep apnea syndrome, diabetes mellitus, non-alcoholic fatty liver disease, etc.). A comprehensive examination for obesity should include: anthropometry, body composition study, blood pressure measurement, EC, ultrasound of the abdominal organs, blood testing for glucose, lipid spectrum (cholesterol, HDL, LDL, triglycerides), liver parameters (ALT, AST, bilirubin, alkaline phosphatase).

Obesity treatment

Diet. Treatment should be aimed mainly at correcting nutrition: nutrition with a physiological quota of protein and a high content of dietary fiber, exclusion of easily digestible carbohydrates, limitation of total carbohydrates and animal fat, enrichment of the diet with omega-3 fatty acids. In case of obesity, it is important to increase physical activity mainly through aerobic physical activity. It is recommended to walk at a moderate-fast pace of at least 10 thousand steps per day. Medicines. For the treatment of obesity the following are used:Liraglutide- enhances the feeling of stomach fullness and satiety, while simultaneously weakening the feeling of hunger and reducing the amount of food taken. Positively affects the glycemic profile and improves carbohydrate metabolism.Orlistat- a peripherally acting drug that has a therapeutic effect within the gastrointestinal tract. And only if conservative treatment of obesity turns out to be ineffective, as well as with severe

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obesity, bariatric surgery is indicated for the patient. Types of operations for obesity: endoscopic installation of intragastric balloons, bypass operations on the small intestine. An intragastric balloon has already been created that does not require surgical intervention or endoscopic installation. The Allurion balloon is compressed into a small capsule that is connected to a thin catheter. Once swallowed, the balloon is filled with 550 ml of liquid through the catheter, which creates a feeling of satiety. The procedure lasts 20 minutes. After four months, the balloon empties on its own through a valve and is then passed out in the stool. The method was tested on more than 2 thousand patients, they lost approximately 12% of weight[13]. In Russia, such a procedure is not yet available.

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