



Review of Current Guidelines for the Treatment of Obesity

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Abstract

Obesity is the most common metabolic disease that has become a serious health problem in both developed and developing countries. Proper treatment of obesity should primarily include the use of an appropriate diet and lifestyle modification. In addition, pharmacotherapy is also used, and in some cases surgical treatment[1]. Before deciding on the choice of obesity treatment method, the cause and severity of the disease, the patient's general health condition, including the complications of obesity, and the goals of treatment should be taken into consideration. It is also necessary to take into account the patient's level of involvement in the treatment process and ensure that the patient fully understands and accepts the proposed therapeutic method[2].

Keywords: obesity, diet, exercises, BMI, pharmacotherapy, laparoscopy

Introduction

Obesity is becoming serious health problem to an increasing extent due to its frequency and numerous complications. According to the World Health Organization, it is the most common metabolic disease which occurrence is defined as an epidemic[1]. The development of medicine has made it possible to establish a procedure for treating obesity.

Methods

We performed a literature search of publications available on Google Scholar describing the procedure for the treatment of obesity.

Description of the state of knowledge

Medical divisions of obesity

Obesity, according to the definition recognized by the World Health Organization (WHO), is the abnormal, excessive accumulation of fat tissue, which may be harmful to health. Obesity should be differentiated from overweight, which we can do using the BMI (Body Mass Index). Obesity in adults is diagnosed when $BMI \geq 30.0$. There are two important divisions of obesity. Taking into account the cause of this disease, primary (simple) and secondary (symptomatic) obesity are distinguished. Primary obesity occurs as a result of the patient's incorrect eating habits and too little physical activity, which leads to a long-term positive energy imbalance and increased body weight. Secondary obesity may result from hormonal disorders, taking certain medications, organic

diseases, or genetic factors. The second division takes into account the distribution of accumulated fat tissue in the body as a criterion. A distinction is made between generalized, android, and gynoid obesity. In a patient suffering from generalized obesity, adipose tissue accumulates in whole body. In turn, the android form of the disease occurs more often in men and means the accumulation of fat on the belly. Gynoid obesity, which affects the buttocks and thighs, is more common in women[3].

Obesity from a social perspective

Obesity is an increasingly common social phenomenon. Statistical data prove that the percentage of obese people in the population has increased since 1975, when it was less than 1%, and in 2016 it was already 3-15%[3,4]. The World Health Organization estimated that over 650 million people were obese in 2016[3]. Between 1975 and 2016, the incidence of childhood obesity quadrupled. Forecasts are also disturbing, predicting that as many as 30% of people will be obese by 2030[3,5]. This problem constitutes a serious challenge for health care, as obese people are significantly more exposed to type II diabetes, cardiovascular diseases, rheumatism, stroke, coronary heart disease, heart failure, pancreatic, esophageal, and kidney cancer, colon cancer, multiple myeloma, meningioma, gastric cardia cancer, hepatocellular carcinoma, endometrial adenocarcinoma, ovarian, breast, thyroid, and gallbladder cancer[3].

First-line treatment

The choice of treatment method and setting a specific goal depends on the cause, the degree of advancement of the disease, the presence of complications, and the patient's awareness of his health condition, and thus his readiness to make the necessary lifestyle changes. The initial stage of treatment for people with obesity includes an appropriately selected diet, physical activity plan, and behavioral intervention, the aim of which is to maintain control over the quantity and quality of meals consumed, as well as to consolidate healthy habits. The basis for weight loss is a diet with reduced energy value, i.e. with a deficit of 500-800 kcal/day in relation to the demand, which is full-value and does not require the elimination of any nutrients. It is important to remember about the safe rate of weight reduction, which depends on gender, age, initial body weight, as well as the patient's individual response to treatment. It is assumed that it should be 0.5–1 kg/week for the first 3–6 months of following the diet. Patients with diabetes or prediabetes should be educated on the correct assessment of carbohydrate content in the diet. When choosing products, they should take into account their glycemic index and choose those with a low value. Research shows that a low-carbohydrate diet is comparable in weight loss to a low-fat diet. The United States Preventive Services Task Force (USPSTF) also recommends limiting sodium chloride intake while increasing consumption of vegetables, whole grains, and omega-3 fatty acids. Patients may be recommended diets such as DASH and the Mediterranean diet[2]. Another diet that may be used in the treatment of obesity is the Atkins diet, the assumptions of which are based on a limited supply of carbohydrates with a free intake of fats and proteins. The diet program consists of four phases. In the first (initial) phase, patients receive a maximum of 20 grams of carbohydrates per day in the form of strictly defined types of food, such as nuts, yellow cheese, cereal seeds, or olives. The initial phase lasts at least 2 weeks, but if the intended weight loss is not achieved, it may be extended. Phase 2 is the "balancing phase" (also called the "ongoing weight loss phase"). Then the amount of carbohydrates consumed by patients is increased by 5 grams per day (reaching approximately 30–50 g per day) at weekly intervals until the weight loss indicator is reached will amount to 0.9 kg per week. Then, a constant supply of carbohydrates is maintained until the weight is reduced by another 2.2–4.5 kg. In the third phase still gradual is used increasing supply carbohydrates such as whole grains and fruit, adding about 10g to your diet per week until sick stop lose weight. In the fourth phase, patients take this number of carbohydrates, at which they maintain body weight at a constant level. This phase starts when patient achieves target body weight and eats foods from normal healthy eating pattern, combining proteins and fats with carbohydrates[6,7]. To assess the impact of various diets, including the Atkins diet, in obese people, Samaha et al conducted a study on a group of 132 people with class III obesity, of which 64 participants were recommended to use the Atkins diet. After 6 months of observation, a significantly greater decrease in body weight and triglyceride levels was found in patients

treated with a low-carbohydrate diet compared to study participants using a low-fat diet. Moreover, in non-diabetic people treated with the Atkins diet, a significantly higher increase in insulin sensitivity was also observed, which was also observed in the study conducted by Volek et al. on 28 people with excessive body weight. Importantly, this study noted that the short-term use of the Atkins diet, compared to a low-fat diet, does not reduce the concentration of LDL-cholesterol. In turn, according to Foster et al. The Atkins diet is associated with greater weight loss compared to the classic diet during both three-month and six-month follow-up. However, the differences disappeared after 12 months of observation of participants in both groups. The authors of the study also attributed the Atkins diet to a reduced risk of cardiovascular diseases. After 12 months of observation, no significant differences were noted in both groups in terms of LDL-cholesterol concentration, diastolic and systolic blood pressure, and an increase in insulin sensitivity. The presence of ketone bodies in urine was recorded in a higher percentage of patients using the Atkins diet only in the third month of the study. The results of studies conducted so far on the Atkins diet are ambiguous and do not allow drawing clear conclusions regarding the effectiveness of this diet in long-term weight loss. This issue requires large, multicenter, randomized clinical trials that would clearly allow for the assessment of its effectiveness and health safety[6].

The first stage of obesity treatment - non-pharmacological treatment, in addition to diet, also includes physical activity and lifestyle changes. Patients who avail oneself of a diet combined with physical activity achieve better results than patients who base their treatment solely on diet. Activities that burden the musculoskeletal system, such as running, playing football, or skiing should be avoided in this case. Instead, obese patients should focus on leisurely walking, cycling, practicing yoga, and swimming. Initially, energy expenditure should be 100-200 kcal per day, and exercise should be performed three times a week at 50-70% VO₂ max (maximum VO₂ max). Subsequently, gradual increase of physical activity intensity should be carried out. An average of 30-60 minutes of activity per day is recommended. Moreover, it has been observed that the combination of aerobic training with resistance (strength) training has a better impact on the patient's health than the type of exercise alone [1,2,8,9]. Strength training is particularly important because it prevents the loss of muscle tissue and thus maintains your resting metabolic rate. It should consist of 8-10 exercises strengthening individual muscle groups. These exercises should be performed 2-3 times a week. The number of repetitions of a given exercise should be 12-15, and the exercise should involve approximately 30-50% of the maximum muscle strength. The series can be performed 1-3 times, with breaks between series ranging from 30 to 60 seconds[10]. The fastest effects in terms of weight loss are observed at the initial stage - when you start physical activity. Over time, this effect decreases in view of the fact that, in addition to reducing fat tissue, the exercises performed by the patient expand the tissue muscle. Research confirms that obese people who exercise achieve better results in weight

loss than people who are on a diet but do not undertake any form of physical exercise[1,2,8,9]. Before implementing physical activity in the treatment of obesity, contraindications such as cancer, circulatory system failure, acute infections, uncontrolled diabetes, periods of exacerbation of coronary heart disease, uncontrolled hypertension, inflammation, or degenerative changes in bones and joints should be excluded. It is important that in the case of concomitant cardiovascular diseases, an exercise test is performed to determine the patient's exercise tolerance. Before each phase of the actual exercise, the patient should perform a warm-up consisting of gentle and slow stretching exercises aimed at improving joint mobility and muscle flexibility. Avoiding fatigue when performing them is recommended. The warm-up should primarily cover those muscle groups that will be involved in the proper phase of the exercise. During exercise, patient should breathe slowly and deeply. It is recommended to perform exercises mainly in positions in which the spine is less exposed to overload (low, isolated positions). As part of the warm-up, you can also perform an appropriate general fitness exercise (at a slow pace). The training should be ended with a so-called cool-down phase lasting from 5 to 15 minutes, the aim of which is to calm down the breathing and reduce the heart rate to resting values. During the cooling phase, exercises from the proper phase continue to be performed, involving large muscle groups, but the intensity of the exercise is much lower. Another activity in this phase is stretching exercises. Ending physical activity in this way supports the return of venous blood from working muscles, which helps avoid fainting and heart rhythm disturbances [10, 11]. The time of day when you exercise is also important in the process of losing weight. Most effective training is performed hour before a meal (preferably before breakfast). If the feeling of increased hunger occurs after physical exercise, the patient should be advised to wait this period, which may be helped by eating a low-calorie meal or drinking still water[10,12].

Medicines used to treat obesity

If the introduction of a diet, physical activity, and lifestyle modification have not yielded results, pharmacological treatment should be implemented, the aim of which, in addition to weight loss, is also the prevention and control of metabolic disorders associated with obesity[1]. One of the drugs used is orlistat, which is a strong and selective inhibitor of pancreatic lipase leading to moderate weight loss. It is recommended in a dose of 120 mg 3 times a day before each fatty meal. Side effects of orlistat mainly concern the gastrointestinal tract, and most often they are the so-called steatorrhea. Orlistat cannot be used in pregnant and breastfeeding women, as well as in people with chronic malabsorption syndrome and cholestasis[1,2,3]. Another drug used is liraglutide, an analogue of glucagon-like peptide 1 (GLP-1), secreted by the ileum in response to a meal. The mechanism of action includes stimulation of insulin secretion and reduction of glucagon release, depending on blood glucose levels. Liraglutide also reduces gastrointestinal motility, which results in a reduction in the amount of calories

consumed by the patient. Moreover, animal studies have shown that this drug stimulates the satiety center and indirectly inhibits the hunger center. The drug is used in subcutaneous injections, and side effects include nausea and vomiting (occur mainly at the beginning of treatment). The maximum therapeutic dose is 3 mg daily[2,3,15]. Liraglutide should be used as the drug of choice in overweight and obese people who have prediabetes, type 2 diabetes, atherosclerosis, metabolic syndrome, clinical features of insulin resistance, and risk factors for cardiovascular events[13]. Another GLP-1 analogue used to treat obesity is semaglutide. It can be given as a subcutaneous injection or oral tablets. The patient should be informed that oral semaglutide must be administered on an empty stomach, at least half an hour before the first meal[3]. Another option for pharmacotherapy is the combination of bupropion - a norepinephrine and dopamine reuptake inhibitor - with naltrexone - an opioid receptor antagonist. The combination of these drugs has an anorexic effect through long-term activation of anorexigenic neurons located in the hypothalamus. Bupropion stimulates neurons secreting proopiomelanocortin (POMC) and the CART (cocaine amphetamine-related transcript) system, resulting in a decrease in appetite and an increase in energy expenditure. In turn, naltrexone intensifies and prolongs this effect by blocking the inhibitory feedback loop on POMC neurons, because as an antagonist of opioid receptors, it prevents β -endorphins from attaching to them. Side effects of this type of drug therapy may include headaches and dizziness, dry mouth, and digestive system symptoms such as vomiting and constipation. The combination of naltrexone and bupropion should not be offered to people with hypertension[2,3]. Recently, setmelanotide has also been used in the treatment of obesity. This drug is an agonist of the melanocortin 4 receptor (MC4R), thanks to which it binds to this receptor, restoring the appropriate activity of its pathway. As a result, the patient's feeling of satiety increases, and the feeling of hunger decreases. Setmelanotide can be used in patients over 6 years of age. The reported side effects include increased skin pigmentation, gastrointestinal disorders, and spontaneous penile erection[3,14].

Surgical treatment

In the case of morbid obesity, the most effective method of treatment is surgery. European guidelines for the surgical treatment of morbid obesity recommend bariatric procedures for people aged 18–60 with class III obesity (BMI \geq 40 kg/m²) and for people with class II obesity (35–40 kg/m²) with comorbidities, such as hypertension, heart failure, type 2 diabetes, metabolic disorders, obstructive sleep apnea, osteoarthritis, as well as psychological problems related to obesity. Surgical treatment of children and adolescents can be performed in a center with specialized pediatric facilities (including anesthesiological, nursing, and psychological staff) and concerns young patients with class III obesity who show signs of skeletal and developmental maturity. In the case of people over 60 years of age, indications for bariatric surgery are considered individually[1,16]. Surgical techniques are divided into restrictive (limiting food intake), exclusionary

(limiting digestion and absorption of consumed food), and mixed-hybrid surgeries. Restrictive surgeries include vertical-banded gastroplasty (VBG), gastric bypass (RYGB), gastric sleeve resection, adjustable gastric banding (AGB), gastric banding, and long/limb RYGB. An example of a disabling operation is biliopancreatic diversion (BPD). Mixed procedures include: biliopancreatic diversion with duodenal switch (BPD-DS) and distal gastric bypass. The first choice when performing surgery should be the laparoscopic technique[16]. The most frequently performed laparoscopic surgeries in the treatment of obesity are gastric bypass and Adjustable Silicone Gastric Banding[17].

Conclusions

The basic treatment for obesity is non-pharmacological treatment, including diet (e.g. low-carbohydrate), physical activity, and lifestyle changes. If non-pharmacological treatment does not bring positive results, pharmacotherapy should be introduced. Drugs used to treat obesity include liraglutide, semaglutide, orlistat, setmelanotide, and a combination of naltrexone and bupropion. In the case of morbid obesity, the most effective method of treatment is surgical treatment. When performing bariatric surgery, the laparoscopic technique is first used.

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Conflict of interest

The authors declare no conflict of interest.

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