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The importance of physical activity in obesity

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Abstract

Obesity is the result of an excessive supply of energy in relation to the body's needs. The etiological factors include environmental factors, genetic factors, sedentary lifestyle, avoiding physical activity, stress or eating excessive amounts of fat. It is estimated that the problem concerns almost 60 million Europeans. Obesity is associated with the possibility of many health complications, including hypertension, carbohydrate disorders, insulin resistance and cancers. Treatment of obesity is a long-term process that needs to be started by finding the main cause, by choosing the right diet, pharmacology, and psychotherapy for rehabilitation. The essence of the fight against obesity is physical activity, which in addition to reducing weight and improving the appearance of other results, such as: strengthening the osteoarticular system, improving the lipid profile, increasing efficiency and physical fitness and improving the mental state. Typical training used in the treatment of obesity are general exercises, characterized by medium or low intensity, effective use of oxygen by working muscles, mobilization of large muscle groups working alternately during exercise, cyclicity and the possibility of long-term exercise without breaks. The features of general fitness

exercises include, among others: Nordic walking, walking, cycling, swimming and water exercises, aerobics, dancing and much more.

Key words: obesity, physical activity, BMI, exercises

INTRODUCTION

According to the World Health Organization (WHO), obesity is "one of the most neglected public health problems" [1]. Already decades ago, the WHO classified obesity as a disease. However, in the Preventing Risks, Promoting Healthy Life report, excessive body weight was among the top ten most important health threats in the world's population [2]. Obesity in the International Classification of Diseases and Health Problems has been marked with the symbol E66 [1]. Obesity is a progressive disease, with no tendency to self-relapse and with a high probability of recurrence. Obesity consists in excessive accumulation of adipose tissue, which leads to the development of metabolic and non-metabolic complications. The consequence of this state of affairs is the deterioration of the quality of life and the shortening of its duration. It is also important that obesity is not only increased fat mass, but also the accumulation of lipids in organs, eg liver, muscles, pancreatic islets [3]. It should be remembered, however, that the fat adipose is an essential component of the body, necessary for the proper functioning of the human system. Many studies have confirmed significant differences in the role of various types in metabolic systemic homeostasis. The importance of not only the overall fat content in the body, but above all its visceral and organ form is emphasized [4, 5].

In the period of infancy and early childhood, the peripheral type of fatness dominates, which over the years has been transformed into a central type. The period of maturation is a critical period for the development of general body fat and the formation of fat distribution in the body. The speed and manner of redistribution of fat tissue is affected by mold. Fat tissue in women grows with age until the end of puberty and is located primarily in the lower half of the body (hips, buttocks). In contrast, men dominate the central type of fatness (mainly the upper half of the body: neck, shoulders, underbelly) [6, 7]. An important role in the development of excessive body mass in developmental age is the quantity and size of adipocytes, which increases if there is a positive energy balance. The final number of fat cells stabilizes at the end of the aging process. Their excessive amount during childhood may lead to the development of obesity already in adolescence and also in adulthood, because it is an irreversible process [6, 7, 8, 9].

EPIDEMIOLOGY

Excessive body weight by the World Health Organization (WHO) is one of the most important chronic non-communicable diseases and has taken the form of a global epidemic. WHO reports that the problem of overweight in 2005 was 1.6 billion, and obesity was over 400 million adults in the world [10].

The number of people with excessive body mass is constantly increasing in developed countries, including Poland [11]. The European Health Survey (EHIS) conducted in 2014 showed that in Poland overweight persons account for 36.6% and obese persons 16.7% of the population aged 15 and more, is 53.3% in total. In contrast, in European Union countries the percentage of overweight people is estimated at 34.8% and people with obesity at 15.4% of the population. The problem of excessive body weight in Poland, as in other European Union countries, concerned men more often than women. The percentage of overweight and obese people is growing steadily. In Poland in 1996, the percentage of people with excessive body mass among the adult population was 27.7%, in 2004 it rose to 29.6%, and in 2009 it reached 53%. The increase was also recorded in other EU countries. However, during the research carried out during the Multicultural National Population Health Survey in 2003-2005 and 2013-2014, anthropometric studies were carried out. They consisted of measurements of body mass and height made by qualified personnel. Analysis of the results showed that the percentage of overweight people in Poland in the age group of 20-74 increased in men from 40.2% to 43.1%, and in women from 27.7% to 29.5%. In turn, the percentage of obese people among men increased from 20.0% to 24.2%, and among women from 22.3% to 23.4% 4 [12].

ETIOLOGY

Many factors affect the development of obesity, including genetic, environmental, socioeconomic and psychological [13, 14]. It is estimated that in 25-45% of obesity is the result of genes. However, the researchers did not discover a single gene affecting excess body weight; it is believed that this is the result of the interaction of many genes [6, 7, 15]. However, there is a tendency of excessive body weight in subsequent generations. Research shows that if two parents are obese then 2/3 descendants will also experience the problem of obesity. If one parent is obese then the probability of obesity among children is 50%. On the other hand, only 9% of children of lean people have problems with excessive body mass [6, 7, 14].

According to the researchers, non-food factors have the biggest influence on the development of obesity, the most important are environmental factors such as: incorrect diet and lack of physical activity [6, 7, 14]. The cause of obesity is the disturbance of the energy

balance as a result of taking in the form of foods and beverages more calories than the body's needs. This process is influenced by an inactive lifestyle, food with a high sugar content and technological changes that reduce physical effort (sitting work) [12].

There are two classifications of obesity:

- based on etiology
- based on anthropometric measurements.

Due to the reason for the creation, it stands out:

- Simple (primary) obesity is a consequence of a positive energy balance, i.e. an excessive supply of calories in relation to expenditure on particular types of metabolism. At the basis of this type of obesity lie above all environmental conditions [8, 14, 16].
- Secondary obesity, which may be the result of endocrinopathy (eg hypothyroidism, disease and Cushing's syndrome, growth hormone deficiency, hypogonadism); genetically determined syndromes (Prader-Willi, Lawrence-Moon-Biedl, Turner, Klinefelter). It may also occur in damage to the hypothalamus due to inflammation, degenerative diseases, tumors, malformations, injuries of the central nervous system and chronic use of certain drugs [14].

Two types of obesity were distinguished using anthropometric measurements. Differing risk of complications:

- Abdominal type (androidical, central, type "apple") - adipose tissue is deposited mainly in the retroperitoneal region. This type of obesity is associated with a greater risk of developing cardiovascular complications and metabolic syndrome and some cancers.
- Femur-thigh type (gynoidal, peripheral, type "pear") - excess fat tissue is deposited around the hips and buttocks. It often occurs in women during puberty [4].

IMPACTS OF OBESITY

The occurrence of obesity is associated with a higher incidence of other diseases and higher mortality. According to the WHO, obesity belongs to the group of chronic non-infectious diseases, which also include diseases such as: cardiovascular disease, diabetes, cancer and some diseases of the gastrointestinal tract. These diseases in most developed and developing countries are considered the main cause of deaths, they affect the shortening of life and its deterioration, as well as social costs related to their treatment. It is estimated that obesity may account for 5% to over 20% of deaths per year in the US and 10% to 13% in Europe. The 2009 Prospective Studies Collaboration included 57 prospective studies and 900,000 people participated. Based on them, it was found that the lowest risk of death

occurred at a BMI of 22.5 - 25 kg/m^2. An increase in BMI by 5 kg/m^2 was associated with an increase in total deaths by 30%, vascular deaths by 40%, deaths from diabetes, kidney and liver diseases by 60-120% and cancer deaths by 10%. In addition, among patients with an index of 30-35 kg/m^2, the survival rate was shorter by 2-4 years, and with the index of 40-45 kg/m^2 by 8-10 years shorter.

Obesity is the third, after hypertension and smoking, risk factor for other diseases. Among these diseases are distinguished: cardiovascular complications (including hypertension, ischemic heart disease, lipid disorders), respiratory (including sleep apnea and asthma), neurological (including stroke and dementia), gastrointestinal and hepatic (including type II diabetes and pre-diabetes), endocrine (including impaired fertility and precocious puberty), skeletal (including degenerative joint diseases, backache), kidney, and also psychosocial consequences (among others: low self-esteem, anxiety, depression, eating disorders, reduced learning results) and numerous cancers. Also, attempts to reduce body weight by improperly chosen measures to support weight loss and radical fasting can be included in the negative effects of obesity [4, 12, 17, 18].

PHYSICAL ACTIVITY IN OBESITY

The analysis of many epidemiological studies shows the impact of reduced physical activity on the development of obesity in the world. The sedentary lifestyle may also have a secondary character, resulting from the limited mobile capabilities of the obese person, which in turn results in a further increase in body weight and the vicious circle closes. At the same time, many years of observation indicate the correlation of longer periods of increased physical activity with a simultaneous reduction in body weight or a decrease in its growth over the years. In addition, Wilmore carried out a meta-analysis of 53 works on weight changes under the influence of physical training without dietary changes. This analysis showed that the 6-month period of increased physical activity leads to a reduction in body weight by 1.6 kg on average, a fat mass reduction of 2.6 kg on average and an increase in lean mass by 1.0 kg. A review of 29 randomized trials in which the treatment of obesity was based only on a low calorie diet or only increased physical activity, or a combination thereof. The results showed that the combined use of diet and increased physical activity causes the greatest reduction in body weight. It is also particularly important that people who exercise regularly after a slimming treatment achieve better long-term results of obesity treatment than non-exercisers [3, 19, 20].

Treatment of obesity is a long-term process, the therapy should start with finding the main cause, by choosing the right diet, pharmacology, and psychotherapy for rehabilitation.

Treatment should be interdisciplinary, requires individual assessment and rehabilitation, which is why professional physiotherapist's help is needed in centers conducting obesity treatment, next to a physician, dietitian and psychologist [21]. Physical activity affects the human body in a multidimensional way, supporting the treatment of excessive body weight. The main benefit is increased energy expenditure, which helps reduce weight. Additional positives resulting from increased physical activity are:

- reduction of fat mass, increase in muscle and bone mass;
- reduction of diet-induced undesirable decrease in resting energy expenditure;
- lowering of high insulin concentration, improvement of glucose tolerance and lipid profile;
- lowering resting and exercise blood pressure and heart rate;
- improvement of efficiency;
- facilitating the long-term maintenance of the dietary regime;
- improving general well-being and improving mental health;
- improvement of emotional state (depression of anxiety, depression) [4, 17, 19].

It seems reasonable to say that physical activity can be treated as the first-line treatment in the treatment of obesity.

PLANNING PHYSICAL ACTIVITY

Physical effort as a form of therapy for obese people should be carefully planned, individually for each patient. Planning must take into account the components of the daily energy expenditure of the organism, which are as follows:

• resting metabolism - 60-70% of the daily expenditure;

• physical activity - is about 15% of the daily expense in people leading a sedentary lifestyle up to 40% in people who have a very active lifestyle;

• food thermogenesis - about 10% of the daily energy expenditure.

Physical activity conducted as part of obesity treatment is divided into daily and planned. Physical activity includes every form of movement during home busting and moving, including: climbing stairs, cleaning, walking one foot stop, etc. It is assumed that any physical activity is better than none and that the more activity on a daily basis, the larger the daily energy expenditure, which has a positive effect on the overall energy balance [19].

According to Brownell et al. [22], four aspects should be considered when planning physical activity:

- type of physical activity;
- intensity;

- Duration;
- frequency.

Type of physical activity

The recommended training used to treat obesity is general exercise, characterized by medium or low intensity, effective use of oxygen by working muscles, mobilization of large muscle groups working alternately during exercise, periodicity and the possibility of long-term exercise without breaks.The features of general-purpose training include: fast (snappy) walking, walking, cycling, swimming and water exercises, aerobics, team sports games (eg volleyball), badminton, gymnastics, cross-country skiing, tennis, climbing stairs, dancing and many others.

The choice of appropriate physical activity for each patient should be based on the assessment of the condition of large joints of the musculoskeletal system, the degree of obesity and previous experiences, preferences and possibilities of the patient. A good choice will be exercises that will not be problematic for the patient and will be pleasant. General exercises can take a different form, so everyone can find a way of exercising convenient for them [22]. The group form of physical exercise further motivates patients to be systematic and contributes to improving the effects of treatment. During therapy, it is beneficial to use stationary devices (bicycle, boatman, treadmill), it allows you to incorporate music and TV exercises and allows you to be physically active regardless of weather conditions.

In people with excessive body mass (BMI> 35) there is an excessive load on the joints and spine, so exercises in water and cycling are especially recommended. These forms of activity are the safest because the joint surfaces of the lower limbs are relieved [23]. In addition, exercises in the water environment involve many muscle groups at the same time, reduce the feeling of pain or discomfort associated with exercising. Be sure to choose the right intensity of exercise to the water temperature [19]. The optimal water temperature for people with obesity should be around 31-32°C. Lower temperatures cause increased heat loss, which requires intensification of training, while a higher temperature impairs the body's heat transfer - then the intensity of exercise should be lower [21].

Exercises that fully load lower limbs (brisk walking, jogging, climbing stairs, etc.) are also recommended, but only in patients who are not at risk of exacerbating degenerative changes in the musculoskeletal system. It depends on the degree of obesity, the age of patients, the advancement of the degenerative processes of the musculoskeletal system and the response of patients to the proposed form of physical activity [19].

Intensity of exercise

The intensity of the exercises in practice is usually determined by the pulse rate. Usually, the formula for calculating the maximum heart rate is used: HRmax = 220- age. From the value calculated in this way, a range of 60-70% HRmax is set as the so-called target training heart rate.

Unfortunately, often patients are reluctant to calculate their training pulse ranges and do not want to control their own heart rate. Then, the "come and speak" rule is used. According to this principle, the opportunity to conduct a conversation during exercise indicates the aerobic nature of the effort [19].

Duration and frequency of exercises

During the First Mike Stock Conference, it was determined that 45-60 min of additional moderate exercise performed daily in free time is sufficient for the prevention of overweight / obesity, and 60-90 min is necessary for the prevention of further re-weight gain in obese people.

In the initial period of physical activity, it is recommended to exercise for 10-15 minutes, and in the following days gradually increase their duration by about 5-10 minutes, so that over time reach the target duration of the exercise.

In addition to general fitness exercises, it is worth joining strength training consisting of 8-10 exercises strengthening individual muscle groups [24]. In the treatment of excessive body weight, this training is beneficial for the patient, because the slimming treatment always leads to a decrease in muscle mass, which results in a decrease in resting metabolism. Resistance exercises are designed to reduce this decline or contribute to the increase in muscle mass and should be used to improve body posture, which in obese people is often disturbed. These exercises should be performed 2-3 times a week for 12-15 repetitions of a given exercise, involving about 30-50% of maximum muscle strength. The series is repeated 1-3 times, and the intervals between series should be 30-60 s [19, 22].

SUMMARY

Obesity is an extremely large social problem of modern people. This is supported by high incidence and growth trends, as well as a significant number of complications associated with excessive body weight, which affect the deterioration of the health of the population.

The factor predisposing to obesity is excessive consumption of high-energy food and decreasing physical activity. People suffering from obesity require intensive diet, physiotherapy, pharmacological or operational treatment. Properly selected and systematic physical effort allows the reduction of body weight, which is accompanied by improvement in

metabolic indicators and health status, as well as the reduction of deaths dependent on obesity.

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