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Modern approaches to the diagnosis, treatment and prevention of obesity

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ABSTRACT

Approximately 2 billion people worldwide are overweight, including about 20% of adults and a quarter of a billion children. In Russia and Europe, about 60% of the population is diagnosed with obesity. According to global data, obesity is the fifth leading risk factor for premature death. The World Health Organization predicts that the number of people with morbid obesity will nearly double in the near future. Obesity increases the risk of cardiovascular, endocrine, and digestive diseases, obstructive sleep apnea, osteoarthritis, etc. Socio-demographic, behavioral and genetic factors are common causes of obesity. The diagnosis of obesity is made through the integrated use of parameters such as body mass index, waist circumference, fasting triglyceride levels, and others. Radiographic and ultrasound methods are being actively implemented. Today in Russia the choice of drugs for the treatment of obesity is very limited. Orlistat, sibutramine, liraglutide are approved for this indication. In addition, gastric electrostimulation and various surgical methods of treatment are effectively used. A targeted and comprehensive approach to improving the healthcare system for people with overweight and obesity should be a key factor in achieving the national goal of improving people's health and well-being. Escalation of prevention efforts at all levels will help significantly reduce the spread of this disease and prevent its development around the world.

Keywords: overweight; obesity; body mass index.

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Современные подходы к диагностике, лечению и профилактике ожирения

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АННОТАЦИЯ

В мире около 2 млрд людей страдают избыточным весом, из них около 20% взрослых и четверти миллиарда несовершеннолетних лиц болеют ожирением. В России и Европе избыточный вес диагностируется приблизительно у 60% жителей. Ожирение в мировом рейтинге факторов риска преждевременной смерти занимает 5-е место. В ближайшее время Всемирная организация здравоохранения прогнозирует прогрессивный рост числа людей, страдающих морбидным ожирением, почти в 2 раза. Ожирение повышает риск развития болезней органов кровообращения, эндокринной и пищеварительной систем, обструктивного апноэ сна, остеоартроза и т. д. К распространённым причинам ожирения относят воздействие социально-демографических, поведенческих и генетических факторов. Для диагностики ожирения применяют интегральное использование таких параметров, как индекс массы тела, величина обхвата талии, значения триглицеридов в крови натощак и других; активно внедряются лучевые и ультразвуковые методы. На сегодняшний день в России выбор препаратов для лечения ожирения весьма ограничен, зарегистрированы орлистат, сибутрамин, лираглутид. Кроме того, эффективно применяются электростимуляция желудка и различные хирургические методы лечения. Целенаправленная политика и комплексный подход, направленные на совершенствование системы оказания медицинской помощи категории людей с избыточной массой тела и ожирением, должны стать ключевыми факторами в достижении национальной цели по укреплению здоровья и благополучия людей. Расширение профилактических мер на всех уровнях поможет значительно сократить распространение данной патологии и предупредить её развитие во всём мире.

Ключевые слова: избыточная масса тела; ожирение; индекс массы тела.

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INTRODUCTION

Obesity is a heterogeneous inherited and acquired disorder [1, 2]. It is a chronic metabolic disorder [2, 3] associated with the excessive accumulation of fat tissue in the body [1–3].

Obesity is prevalent throughout the world, particularly in developed countries, the former socialist economies of Europe, Latin America, and the Caribbean [4]. Since the mid 1970's, the number of obese patients has tripled [5]. Currently, 1.0 to 1.9 billion adults are overweight, including more than half a billion people who are obese. In Russia and Europe, approximately 60% of the population is overweight or obese [4, 6]. Of the total number of people with morbid obesity, over one hundred million are under 18 years old [7–9]. It is estimated that up to 250 million people worldwide are obese, with two to three times as many individuals being overweight [8]. For the first time in history, the number of overweight patients exceeded the number of malnourished individuals [4, 8, 10].

Russian healthcare costs for the management of patients with obesity and associated co-morbidities are estimated at 5–14% and 70%, respectively [11]. Mortality in obese people aged 20–35 years is 12 times higher than average, mainly due to cardiovascular complications [12]. In 2019, obesity is the fifth leading risk factor for premature death [13].

The prevalence of obesity is rising [14]. In 2015–2016, the prevalence of obesity in the U.S. population was 39.8%, or approximately 93.3 million American adults. By 2030, the number of obese people is expected to increase to one in two adults [4, 15]. According to the World Health Organization (WHO), the population with a confirmed morbid obesity will double in just one year, representing approximately 30–50% of the total population in high-income geographic areas [4, 5, 15, 16]. This level of incidence can be considered a pandemic due to the rapidly increasing number of overweight people worldwide [17].

EPIDEMIOLOGY

Fat deposits form an active hormonal depot with internal secretion, which has a significant impact on metabolic mechanism and processes in the body. Impaired metabolism of macro and trace elements leads to the metabolic syndrome, which is associated with increased insulin tolerance, thrombosis risk, increased production of inflammatory mediators, lipoprotein disbalance, increased triglyceridemia, resulting in progression of disseminated atherosclerotic lesions in the body [12, 18, 19]. Pathogenetic mechanisms in overweight patients are determined by increased angiotensin-converting enzyme-2 activity, subacute inflammation, rapid onset of a cytokine storm, and decreased dipeptidyl peptidase-4 activity in metabolic reactions due to impaired metabolism and immune defense responses [14, 20].

Obesity is caused by external (sociodemographic, behavioral, etc.) and genetic factors [21, 22]. Factors of morbid obesity include genetic predisposition; level of material well-being; mother and child condition [7], including consideration of the fact of pregnancy, which is often associated with hyperglycemia in the mother; obstetric aids and type of feeding; timing of introduction and balance of complementary feeding; newborn weight gain over time; treatments during pregnancy [23, 24].

One of the main causes of obesity is insufficient physical activity and impaired physical mobility such as hypodynamia due to the use of vehicles, gadgets, television, remote work options, chronic stress, irregular meals and/or consumption of “unhealthy” foods, their excessive calories, lack of sleep, smoking, etc. [1, 4, 25]. Eating habits that contribute to weight gain are also important; frequent intake of salt, sugar and sweets, insufficient intake of fruit and vegetables [17, 26]. Psychological stress also activates the central nervous system, leading to changes in the body's metabolism, excessive accumulation of energy in the form of lipids, which contributes to weight gain and development of morbid obesity [27].

Peterkova et al. [8] and the authors of the study [28] classified obesity by causative factors as follows: constitutional exogenous or idiopathic obesity reported in 98–99% of patients (due to excessive caloric intake combined with hypodynamia and hereditary predisposition); hypothalamic obesity (due to tumors of the hypothalamus and/or brainstem, radiotherapy for brain tumors and hematologic malignancies, head injury or stroke); iatrogenic obesity (due to long-term use of corticosteroids, antidepressants, etc.); syndromic obesity (due to chromosomal and other genetic syndromes such as Prader–Willi syndrome, fragile X chromosome, Alström syndrome, Cohen syndrome, Down syndrome, pseudohypoparathyroidism, etc.); monogenic obesity (due to mutations in genes encoding leptin, due to mutations in the genes of leptin, the leptin receptor, melanocortin 3 and 4 receptors, proopiomelanocortin, type 1 proconvertase, tropomyosin-related kinase B receptor).

RISKS OF DEVELOPING DISEASES AND MORTALITY IN OVERWEIGHT PATIENTS

Obesity increases the risk of various conditions such as cardiovascular diseases (hypertension, myocardial ischemia, etc.) [18], endocrine disorders (hyperglycemia, etc.), liver cirrhosis (increase by 30–50%), gastroesophageal reflux disease (increase by 50%), gallbladder and pancreatic cancer (increase by 35–85%), erosive esophagitis (increase by 50–100%), Barrett's esophagus and esophageal adenocarcinoma (increase by 2 times), cholelithiasis (increase by 2–3 times), nonalcoholic fatty liver disease (increase by 2–4 times), colon cancer

(increase by 2–3 times), obstructive sleep apnea, osteoarthritis, etc. [1, 29]. Obesity reduces quality of life by limiting physical and social activity, decreasing sleep quality, and increasing depression and anxiety [16]. In addition, obesity aggravates some conditions such as COVID-19, influenza (including H1N1), polycystic ovary syndrome, gastroesophageal reflux disease, stress incontinence, and coronary heart disease [14, 20, 24, 30]. However, data on the effect of significant overweight on breast and prostate cancer risk are conflicting, depending on menopausal status and stage of disease, respectively [24, 31] (Table 1).

Table 1. Risk of diseases in obesity

Diseases	Increased incidence of disease
Gastroesophageal reflux disease	By 50%
Erosive esophagitis	By 50–100%
Barrett's esophagus	×2
Adenocarcinoma of the esophagus	×2
Nonalcoholic fatty liver disease	×2–4
Cirrhosis	By 30–50%
Cholelithiasis	×2–3
Gallbladder cancer	By 35–85%
Pancreatic cancer	By 35–85%
Colon cancer	×2–3

Patients with excessive fat accumulation are more likely to have gastrointestinal disorders, including a 1.29-fold increase in abdominal pain, a 1.76-fold increase in abdominal heaviness after meal, a 3.39-fold increase in belching, a 3.11-fold increase of epigastric burning, a 1.7-fold increase in vomiting, a 1.64-fold increase in frequent and loose stool, and a 1.36-fold increase in fecal incontinence [29, 32].

It should be noted both overweight and low body mass index (BMI) increase mortality in certain populations [4–6]. A meta-analysis showed the increased risk of death in patients with a BMI below or above the optimal range of 20.0–25.0 kg/m^2, and the more significant association of a BMI >25.0 kg/m^2 with the increased risk of mortality was reported in men and young people [33]. Central obesity (which cannot be defined by BMI) is strongly associated with the cardiovascular risk and all-cause mortality in the population [18, 34]. In patients with coronary heart disease, the waist-to-hip ratio has a linear relationship with the increased risk of death [13, 35]. Increased visceral body fat also increases the risk of metabolic disorders and mortality [35]. The location and regional distribution of visceral fat determines the overall impact of obesity on a patient's cardiometabolic health [1, 35].

DIAGNOSIS OF OBESITY

Severity of obesity was assessed using the WHO International Obesity Classification (1997) or its modifications, with BMI 30.0–34.9 kg/m^2 for grade 1 obesity, BMI 35.0–39.9 kg/m^2 for grade 2 obesity, and BMI ≥40 kg/m^2 for grade 3 obesity [6, 15, 19, 36].

However, estimates of BMI and waist circumference are not sufficiently informative [37]. For example, athletes may have less body fat, but still have significant weight due to their developed muscles. Based on their BMI, they may be diagnosed as "overweight" or "obese" despite normal body fat [36]. The use of BMI to determine the degree of obesity is also limited in pregnant women, people with missing limbs, and people with edema syndrome [11, 37].

Since body volume is particularly important in the diagnosis of obesity, the concept of body volume index has been developed, which uses body weight divided by height cubed to estimate body fat content. This index is called a triponderal mass index [35]. This index is more accurate than BMI [38].

The WHO underlines the need to assess other parameters in addition to BMI (WHO, 2000). A number of alternative parameters have been proposed, including percentage of body fat evaluated using bioimpedance analysis (BIA), indices based on waist circumference (WC), waist-to-hip ratio, and a body shape index (ABSI) [35]. Based on BIA parameters, Burkhauser and Cowley found that using BMI to diagnose obesity resulted in false negative results in 33.5% of cases; the error rate was 3% when using WC and 45–70% when using BMI [39].

Waist circumference is one of the diagnostic criteria for metabolic syndrome [37, 40]. However, the waist reference point also depends on BMI [37, 40].

To diagnose obesity, several parameters are used in an integrated manner, such as body length, body weight, BMI, weight to body area ratio, waist and hip circumference, estimated subcutaneous fat thickness, morning triglyceridemia, and the state of the body's internal environment. In addition, investigations such as radiology and ultrasound, BIA, and dual-energy radiography are used [1, 2, 19, 37, 41].

Recent studies suggest that current metabolic syndrome guidelines need to be revised to ensure the use of accurate epidemiologic data [37, 40].

Dual-energy radiography assesses multiple body dimensions (length, circumference, and volume) and may provide more accurate results than conventional methods [41]. Indirect calorimetry appears to be an effective additional method for assessment of diet therapy [42].

An alternative way to characterize obesity is to measure biomarkers, including insulin/insulin-like growth factor, specific adipokines such as leptin, adiponectin, resistin, and interleukin (IL) [19]. Levels of proinflammatory cytokines (IL-6 and IL-8, and tumor necrosis factor alpha) are increased in serum and white adipose tissue of obese individuals [19]. IL-6 production in local adipose tissue is higher in patients with a higher waist-hip ratio. Since IL-6 controls C-reactive protein production, and since C-reactive protein increases with adiposity and decreases with weight loss, it should be

noted that this relationship may be stronger in females than in males [33, 34, 43]. Obesity is associated with thrombocytosis because elevated IL-6 levels increase thrombopoietin levels and megakaryocytopoiesis, leading to obesity [33, 34]. IL-6 and IL-8 are key inducers of leukocytosis; 15% of patients with persistent leukocytosis are obese [1, 11, 43].

PREVENTION OF OBESITY

The increasing number of overweight and obese individuals and the rise in associated morbidity require optimization of preventive, therapeutic, and surgical options [2, 39].

Individuals with overweight and obesity are not always able to critically assess their body weight; correct assessments were provided by 80% of patients with overweight and grade 3 obesity, 50% with grade 3 obesity, and only 25% with grade 1 obesity [16, 44]. For this reason, European countries have established special monitoring systems [44]. In Latin America, nutrition surveillance has been conducted since 1977, but types of system developed and introduced vary greatly from country to country [41]. Some countries have planned or implemented guidelines for healthy diet and physical activity [44]. Many European countries have national dietary guidelines [26]. They consider food culture, taste preferences, regional color, and people's mentality [26]. The same approach has been used to develop guidelines for school nutrition (in seventeen countries), to actively promote a balanced diet (in six countries for the general population and in eleven countries for school nutrition), to encourage and involve people in sports activities (in nine countries), and to promote crop cultivation and animal husbandry among land-owning families (in four countries) [26, 39, 45].

Some countries use special labels on food packaging. In 2018, mechanisms were proposed for implementation of a universally accepted label on the front of all packages with information on increased sugar, salt and/or fat content [45]. Currently, universal food labeling (in sixteen countries) and workshops on healthy eating for school children (in nine countries) are the most widely used regulatory measures in Europe to prevent the rise of obesity. The most common programs to prevent overweight and obesity include balanced school meals (in seventeen countries), promotion of healthy foods (in fourteen countries), and balanced supplementary meals (in eleven countries) [45, 46].

Regulation of food intake and increase in physical activity reduce the risk of obesity and can provide an even distribution of body weight, proper metabolism, and improved health even in the absence of significant loss of excessive weight [44, 46]. Many studies have shown that a combination of proper diet and regular physical activity is the most effective way to reduce excessive body weight and maintain long-term weight loss [47]. In addition, ministries of health are responsible for supervising obesity prevention strategies in most countries [15, 47].

Most healthcare organizations promote obesity prevention programs as a high priority with a unique role in controlling the obesity pandemic [5] because they know their target population well and have strong relationships with other organizations involved in obesity prevention [5, 47]. Global health communities recommend preventive care to be provided at all levels of healthcare systems, regardless of the patient's age or health status [15, 48]. For example, the USA has special nutrition assistance programs for women, infants, and children [48]. Lifestyle modification (diet therapy, increased physical activity, and correction of eating habits) is an integral part and basis of the prevention and treatment of obesity. The caloric content of foods and the adequacy of food utilization should also be considered. When patients perceive obesity as a disease rather than an isolated eating disorder, their self-control and sense of responsibility often decrease, negatively affecting treatment outcomes [49].

If diet therapy and exercise are not effective enough, it is recommended to use additional physiotherapeutic procedures (mineral water, mud therapy, therapeutic baths, heat and cold therapy, electrotherapy, and magnetic laser therapy), various types of therapeutic massage and exercise therapy, reflexotherapy, etc. [44, 47, 49].

TREATMENT OF OBESITY

Currently, in Russia, non-surgical treatment includes only a few approved pharmacological agents, including orlistat, sibutramine, liraglutide, and semaglutide [42, 43, 50].

Sibutramine (an inhibitor of the reuptake of serotonin, norepinephrine, and to a lesser extent dopamine, at the synapses of the central nervous system) is an agent used for the non-surgical treatment of obesity with a dual mechanism of action. It both accelerates the feeling of satiety, which reduces the amount of food consumed, and increases the body's energy expenditure, which together lead to a negative energy balance [50]. It should be noted that sibutramine was withdrawn from the US market in 2010 following evidence of an increase in combined cardiovascular events in patients with obesity and pre-existing vascular disease [51].

Liraglutide is a dipeptidyl peptidase-4-resistant human glucagon-like peptide-1 analog, which regulates appetite by increasing feelings of fullness and satiety and decreasing hunger [43]. Liraglutide has a greater effect on carbohydrate metabolic status [50].

Orlistat (a gastrointestinal lipase inhibitor) is a peripherally acting agent that has a therapeutic effect on some parts of the gastrointestinal tract and does not have systemic effects [43, 51]. Orlistat is officially approved for use for 48 months. A four-year study showed only moderate weight loss in the orlistat group compared with the placebo group (5.8 kg vs 3.0 kg) and a transient improvement in cardiometabolic risk factors [51].

Semaglutide is also a glucagon-like peptide-1 agonist. Compared with liraglutide, it was effective in reducing body weight by more than 5% and reducing cardiovascular mortality in patients with type 2 diabetes mellitus [42, 51].

Noradrenergic agents such as phentermine[1] and diethylpropion[1] were approved for 3-month therapy in the United States several decades ago, before obesity was recognized as a chronic disease requiring ongoing treatment [51–53]. Individuals who lost more than 0.5 kg per week during the first month of therapy were more likely to achieve a sustained and significant response with longer-term treatment [52].

In Europe, there are currently four sympathomimetic drugs such as phentermine[1], benzphetamine[1], diethylpropion[1] and phendimetrazine[1], which suppress appetite and are approved for the short-term treatment of obesity (less than 3 months) [43, 52, 53].

Since 2012, two more drugs have been approved in the USA; these are lorcaserin[1] and phentermine/topiramate[1], which are indicated for weight loss in adult patients with a baseline BMI ⩾30 kg/m^2 or ⩾27 kg/m^2 and a comorbid disorder associated with overweight (hypertension, dyslipidemia, type 2 diabetes mellitus) [52, 53]. In 2020, lorcaserin1 was withdrawn due to a high risk of cancer [43, 52, 54].

In addition, in 2012, the therapeutic efficacy of an extended-release combination product naltrexone/bupropion1 was re-evaluated in the USA [51]. The drug was evaluated in four phase III clinical trials, which showed a good weight loss effect in overweight and obese patients (5.0–9.3%) compared to placebo (1.2–5.1%) and improvement of metabolic parameters [54]. There are ongoing studies which evaluate the effects of naltrexone/bupropion on cardiovascular diseases.

Currently, treatment options for obesity are expected to include sodium-glucose cotransporter 2 inhibitors, centrally acting drugs, intestinal hormones, and incretin targets, and other new targets; in addition, obesity vaccines are being developed [54].

Since 1995, gastric electrical stimulation has been used to treat obesity [55]. Gastric dilatation leads to a feeling of satiety, but this mechanism is less effective in individuals who are already obese [46, 55]. Electrical stimulation devices are designed for obese patients [46]. Three devices are currently used for this indication: Transcend® (Medtronic Transneuronix, Inc., Ireland), Maestro Rechargeable System® (EnteroMedics Inc., USA), and DIAMOND® (MetaCure Inc., USA). In addition, a new device Abiliti (IntraPace, Inc., USA) is currently under development and implementation [55].

Transcend is a device similar to a pacemaker that is placed in the stomach laparoscopically. A landmark for its location is 3 cm from the edge of the lesser curvature of the stomach and 6 cm proximal to the pylorus. The generated electric pulse has the following characteristics: amplitude of 10 mA, duration of 208 μs, frequency of 40 Hz. The electric pulse is switched on for 2 s and off for 3 s every 24 h [46]. Open, mostly uncontrolled studies in patients with morbid obesity treated for 6 months to 2 years reported an average reduction in excessive body weight of approximately 20–30% [55].

Maestro has electrodes that are implanted laparoscopically into the projections of the anterior and posterior vagus nerve branches at the level of the gastroesophageal junction. A pulse regulator is located in the subcutaneous fat of the anterior abdominal wall. The average excessive weight loss in a pilot study in patients with morbid obesity treated for 6 months was 14.2% [55].

The DIAMOND device is based on another principle. The device consists of three pairs of bipolar electrodes which are attached to the gastric fundus, anterior antral area, and posterior antral area by laparoscopic surgery [55]. The electrodes are attached to a pulse generator which is placed in a surgically constructed pocket in the abdominal subcutaneous fat. The pulse generator is connected to the charging coil and is programmed by an external device [55]. This electrical stimulator showed the greatest efficiency compared to the previous two.

The Abiliti system consists of a wire with multiple electrodes, an intragastric sensor that detects food intake, and a pulse conduction electrode that is implanted along the vagus nerve fibers along the lesser curvature of the stomach. The generator sends an impulse to the electrode during the recorded process of food consumption. The impulse is recorded by a 3D accelerometer and an intragastric sensor. A healthcare professional evaluates the information about the patient's digestive activity provided by the device to develop an algorithm for the patient's proper eating behavior and habits [55].

BARIATRIC SURGERY

Bariatric surgery is an important tool in obesity management, as it not only promotes weight loss, but also significantly improves the metabolic status of the patient's body [56]. This treatment option was recognized as the most effective by the results of a study conducted by the National Institutes of Health in the USA [57]. Metabolic surgery as part of bariatric surgery aims not only to improve appearance through weight loss, but also to stabilize the function of internal organs and body systems [56].

Many different types of such operations have been developed, which can be roughly divided into three groups. The first group includes operations that limit the amount of food consumed using techniques such as gastric banding, intragastric balloon placement, longitudinal gastric resection, and gastroplication [58, 59]. The second group includes

[1] This drug is not approved in Russia.

malabsorptive surgeries, which aim to reduce the absorptive surface area in the intestine. There are also combined operations, which are a combination of different techniques [58, 59].

Of all types of bariatric surgery, the most common ones include longitudinal gastrectomy, one-anastomosis gastric bypass, Roux-en-Y gastric bypass, and biliopancreatic bypass with a duodenojejunostomy (SADI modification) [59].

Bariatric surgery is an effective surgical treatment for overweight and obese patients [56]. Bariatric surgery has several effects on the patient's body [59]: 1) restriction (a reduction in the volume of the stomach for rapid satiety with less food; this allows control of food intake and reduce the caloric content of the food consumed [60]); 2) malabsorption (a reduction in the absorption of nutrients by bypassing different parts of the small intestine [61]).

Bariatric surgery has a variety of effects on the human body, including reducing the absorptive surface area of the small intestine by bypassing it [62]. After the surgery, the patient develops the so-called incretin effect, which has a significant impact on the progression of type 2 diabetes mellitus [63]. Glucagon-like peptide-1 plays a key role in this process [63]. Proximal intestinal bypass can compensate for humoral disturbances by stimulating an appropriate insulin response in the diabetic patient [62, 63]. For example, one of the results of longitudinal gastrectomy is the removal of the area responsible for ghrelin production [61]. Ghrelin is a hormone that controls appetite and fullness [61, 64]. A significant factor is the alteration in the concentrations of both ghrelin and leptin, which results in modifications to metabolic processes and dietary behaviors in patients following bariatric surgery [65]. These modifications impact the regulation of hunger and satiety, which in turn influences the ultimate outcome of diabetes and obesity treatment [63, 65].

Studies reported significant changes in the concentrations of circulating bile acids after bariatric surgery [64, 66]. Increased blood levels of these acids were observed, which is explained by a decrease in postprandial glucose levels [63]. Special attention is given to the effects of fluctuations in bile acid levels on glycemic control and energy expenditure, with a focus on TGR5 membrane receptors and FXR nuclear receptors [66].

Therefore, bariatric surgery both reduces food intake and improves digestion and absorption of nutrients [67]. These results support the hypothesis of an endocrine effect of such surgical procedures. In addition, studies show that after bariatric surgery, adiponectin, a hormone associated with anorexia, increases, while leptin and chemerin, which regulate satiety and metabolism, decrease [66, 68]. Changes in dietary macronutrient composition, pH levels, and gut microbiota after surgery may have long-term implications for overall health. These factors should be considered in the context of medical interventions for successful treatment outcomes [58, 59, 66].

Surgery is an effective treatment option for complicated morbid obesity [68]. This trend is common among the working-age adult population [56, 68]. It should be noted that this treatment option provides the most durable result, but persistent postoperative adverse effects require further research [67, 68].

CONCLUSION

Overweight and obesity affect almost 60% of adults in Russia and Europe. In 2019, obesity is ranked as the fifth foremost reason for premature death globally. The WHO estimates that the number of people suffering from overweight and obesity will double in just one year, reaching 30–50% of the population in highly developed economies. By 2030, nearly one in two adults in these countries will be obese. A systematic prevention policy and a comprehensive treatment approach are aimed at improving the healthcare system for overweight and obese people. These proactive steps should become key factors in achieving the national goal of improving people's health and well-being. The intensification of prevention initiatives at the local, regional, and federal levels will prove instrumental in curbing the spread of this disease and staving off the emergence of an obesity pandemic.

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