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Childhood obesity - risk factors and prevention strategies

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Abstract

Introduction and purpose: Obesity is one of the most serious health challenges in modern society. Over the last 40 years, the number of obese school-age children has increased tenfold. This not only has significant consequences for physical health, but also affects psychosocial aspects and the quality of life of the young generation. The aim of this study is to conduct a comprehensive review of the literature on obesity among children and adolescents, focused on identifying the main risk factors and analyzing effective forms of prevention.

Materials and methods: A review of the literature available in the "PubMed" database and books was conducted. The search was performed by using the following keywords: "childhood obesity", "childhood obesity risk factors", "childhood obesity prevention"

State of knowledge: The risk factors for obesity in children and adolescents include genetic factors, endocrine diseases, improper diet, low physical activity, low socioeconomic status, stress, psychological factors, short sleep time, medications, hypothalamic obesity and H.

pylori. As part of the prevention of obesity in children and adolescents, it is recommended to develop appropriate habits in children and adolescents. The influence of parents on health behaviors in children is important. Top-down activities such as health campaigns and legal regulations also have a significant impact.

Summary: Due to research conducted over the years, awareness of obesity risk factors has increased. To effectively prevent this disease, an integrated approach is necessary, taking into account both education and changes in the social environment. Implementing these strategies requires cooperation at local, regional, national and international levels.

Keywords: childhood obesity; childhood obesity risk factors; childhood obesity prevention

Introduction and purpose

Obesity is one of the most serious health challenges in modern society, and its increase among children and adolescents is a disturbing trend. According to the World Health Organization, in just 40 years the number of school-age children and adolescents suffering from obesity has increased more than tenfold [1]. The problem of obesity and overweight affects 340 million people aged 5 to 19 [2]. This not only has significant consequences for physical health, but also affects psychosocial aspects and the quality of life of the young generation. Therefore, it becomes important to understand the risk factors associated with obesity among children and adolescents and to develop effective preventive strategies. The aim of this study is to conduct a comprehensive review of the literature on obesity among children and adolescents, focused on identifying the main risk factors and presenting current methods of prevention.

Materials and methods

A review of the literature available in the "PubMed" database and books was conducted. The search was performed by using the following keywords: "childhood obesity", "childhood obesity risk factors", "childhood obesity prevention" and the collected information was thoroughly analyzed.

State of knowledge

Risk factors

Genetic factors. In most cases obesity is polygenetic [3]. However, it has been found that it may be caused by defects in single genes, and the most common ones include defects in the melanocortin-4 receptor, which account for 5–6% of cases of early-onset obesity in children. The onset of severe obesity in early infancy raises the suspicion of genetic mutations in the leptin signaling pathway or melanocortin-4 receptor abnormalities [4]. A single nucleotide polymorphism (SNP) in Fat Mass and Obesity Related (FTO) gene has also been associated with obesity [5]. Children with obesity-related genetic syndromes usually present with early-onset obesity and characteristic physical examination findings - short stature, dysmorphic features, developmental delay or intellectual disability, retinal changes, and deafness. The most common syndrome associated with obesity is Prader-Willi syndrome.

Endocrine diseases. Endocrine disorders cause weight gain in less than 1% of children and adolescents suffering from obesity [7,8]. Endocrine disorders causing weight gain include endogenous or exogenous glucocorticoid excess, hypothyroidism, growth hormone deficiency, and Albright syndrome [6]. Most children with endocrine disorders causing weight gain are characterized by poor linear growth, short stature and hypogonadism [8].

Diet. Some researches suggest that high energy intake in infancy and high consumption of sweetened beverages in childhood are associated with the risk of childhood obesity [9]. In a prospective study, it was observed that the risk of obesity increased 1.6 times for each additional serving of a sugar-sweetened beverage [10].

Eating fast food ≥ 2 times per week has been shown to be associated with increased BMI [11]. Over the last two decades, the consumption of fast food has tripled [12,13]. Some evidence shows an inconsistent association between fat intake and obesity in children and adolescents [14,15]. The National Health and Nutrition Examination Survey (NHANES) found that fat intake among U.S. children has declined over the past few decades, while the incidence of childhood obesity has increased [16, 17]. Meal timing is also believed to play a role in the occurrence of obesity - eating breakfast reduces its occurrence [18], while evening snacks contribute to its development [19].

Physical activity. Physical inactivity and a sedentary lifestyle are likely to be associated with childhood obesity [20, 21, 22], although the effect may be small [23]. Prospective studies have shown that more hours spent in a sedentary lifestyle, especially watching television or playing video games, were associated with the occurrence of obesity in later life [20, 22].

Socioeconomic status. Based on research conducted in Denmark, France, Germany and Sweden, an inversely proportional relationship between socioeconomic status and the degree of overweight and obesity was observed among children living there [24]. The opposite relationship occurred in developing countries [25]. In developed countries, children from ethnic minorities, including children of immigrants and the so-called first-nation children (e.g. American indigenous people) were most at risk of being overweight or obese. The reasons for this are probably adaptation difficulties and changes in lifestyle along with reduced physical activity [26].

Stress. Children are more susceptible to stress than adults. Stress significantly affects eating behavior. It often leads to an increase in the volume and speed of eating, irregular meals and the consumption of more fast food and snacks, which contributes to weight gain [27, 28].

Psychological factors. Studies have shown that depression, anxiety and low self-esteem were often observed in children with obesity [29, 30, 31]. An important psychological factor causing obesity, especially in girls, is body dissatisfaction. In girls, a linear relationship between body dissatisfaction and the increase in BMI was found, while in boys it was a U-shaped relationship [32, 33].

Sleep. It is believed that shorter sleep duration may be associated with obesity in children [34, 35]. Some prospective studies have confirmed this relationship, both in the short term in young children and in the long term persisting into adulthood [36, 37]. When combined with other positive household activities such as family meals and limiting screen time, obtaining adequate sleep has a strong inverse association with obesity among preschool children [38].

Medicines. The use of certain medications may contribute to obesity. These include glucocorticosteroids [39], antipsychotic drugs such as risperidone or olanzapine [40] and antiepileptic drugs [41].

Hypothalamic obesity. Hypothalamic obesity is secondary obesity caused by changes in the functioning of the hypothalamus, which is the central organ of energy homeostasis. Acquired hypothalamic lesions, such as craniopharyngioma, especially after cranial surgery or radiotherapy, and diencephalic tumors may manifest as weight gain [6].

Prevention

Obesity prevention should be implemented as early as possible in life because childhood obesity is likely to persist into adulthood [42]. It has been shown that preventing obesity brings much better results than treating it once it develops [43]. The basis for obesity prevention is developing appropriate eating and physical activity habits. The involvement of all family members is recommended [44]. It is important for the child's parents to have knowledge about the dangers of obesity. Their role is to control the child's weight and encourage health-promoting activities.

Diet. The child's diet should be balanced, avoiding highly processed, high-calorie products with a high content of saturated fats and simple sugars. It is advisable to eat fruits and vegetables in recommended amounts. Moreover, it is important that meals are eaten regularly, in a quiet atmosphere, preferably with other family members - it has been shown that family meals are associated with higher diet quality and a lower incidence of obesity, as well as other psychosocial benefits [6].

Physical activity. The child should be encouraged to be physically active for at least 20 minutes a day (optimally 60). It is also worth reducing the time a child spends watching TV and browsing the Internet to less than two hours a day [44].

Prevention programs and legal regulations. Preventive programs introduced in individual countries may have a significant impact on reducing the number of overweight and obese people. The country that applies the most preventive measures is the Netherlands. It is also a country with a low obesity rate [45,46]. Over the years, the European Union has developed, among others, the "Strategy on nutrition, overweight and obesity-related health issues" (2007), focusing on actions that can be taken at the local, regional, national and European level [47].

As part of the Strategy, the "Owoce i warzywa w szkole" and "Mleko w szkole" programs were implemented in Poland. The aim of the programs was to improve children's eating habits through education and free access to vegetables, fruit and dairy products. Since 2017, both programs have been combined into the "Program dla szkół", which covers students of grades I-V of most Polish primary schools [48]. In Poland, there are also conducted educational programs, such as "Trzymaj Formę" or "5 porcji zdrowia w szkole" [49,50]. Since 1995, Poland has adopted four editions of the National Health Programme, the current one is planned for 2021-2025 [51]. As a result of the 2015 Act, amended in 2016, food products sold in units of the education system must meet specific requirements [52]. Moreover, according to the 1992 Act, amended in 2015, programs for children should not be accompanied by commercial messages regarding food or beverages containing ingredients whose presence in excessive amounts in the daily diet is inadvisable [53].

Summary

Obesity is one of the most serious health challenges in modern society. Due to research conducted over the years, awareness of the risk factors of this disease has increased. However, to effectively counteract obesity, an integrated approach is necessary, taking into account both education and changes in the social environment. Prevention should be focused on various aspects of the child's life, from diet and physical activity to psychological aspects. Implementing these strategies requires cooperation at local, regional, national and international levels.

Author's contribution:

Conceptualization, B.M., J.R.; methodology, B.M., J.R., K.M. software, K.M, P.B., M.R., P.R., J.R., W.R. check, B.M., J.R.. K.M.; formal analysis: B.M., J.R.; investigation, B.M., J.R., K.M, P.B., M.R., P.R., J.R., W.R.; resources, B.M., J.R., K.M, P.B., M.R., P.R., J.R., W.R.; data curation, writing - rough preparation, B.M., J.R., K.M, P.B., M.R., P.R., J.R., W.R.; writing - review and editing, visualization: B.M., J.R., K.M, P.B., M.R., P.R., J.R., W.R; supervision, project administration: B.M., J.R.;

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