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Obesity in childhood - literature review and educational recommendations

Aleksandra Kiełczewska

Polish Mother's Memorial Hospital, ul. Rzgowska 281/289, 93-338 Łódź, Poland,

ola.kiel10@gmail.com

ORCiD: https://orcid.org/0009-0002-4283-4487

Grzegorz Szcześniak

Independent Provincial Hospital named after Nicolaus Copernicus in Piotrków Trybunalski, ul. Rakowska 15 97-300 Piotrków Trybunalski, Poland
gszczesniakk@gmail.com
ORCiD: https://orcid.org/0009-0008-3726-5164

Anna Kiełczewska

Medical University of Warsaw, ul Żwirki i Wigury 61, 02-091 Warsaw, Poland

ORCiD: https://orcid.org/0009-0009-1690-506X

ABSTRACT

Introduction and purpose

Childhood obesity is a major global health concern. The World Health Organization reports that the prevalence of obesity in children and adolescents has increased significantly from 4% in 1975 to over 18% in 2016.The aim of the study is to conduct a comprehensive review of the literature on obesity among children and adolescents, emphasizes the importance of prevention, identification and effective management of childhood obesity.

Materials and methods

An extensive examination of articles published in scientific journals was carried out through online research platforms PubMed and Google Scholar. We searched articles by entering keywords in appropriate configuration: “childhood obesity”, “pediatric overweight”, “physical activity”, “activity and health”, “diet and obesity", "bariatric surgery" and "obesity medication".

State of knowledge

Treating childhood obesity requires following a personalized weight loss program, as well as adopting healthy eating habits and lifestyle practices. Improvements in metabolic and anthropometric indices can be achieved through complex interventions including dietary modification and physical activity, behavioral therapy, health promotion education, pharmacological treatment and bariatric surgery A step-by-step approach to managing weight is recommended, considering the child's age, the severity of obesity, and any accompanying health conditions. Dietary interventions focus on promoting a balanced, nutrient-rich diet that is calorie-appropriate for the child's age and gender.

Summary

Further research is still necessary to develop additional pharmaceutical options, refine surgical techniques, and better understand long-term outcomes in this patient population.To effectively prevent this disease, a comprehensive approach is necessary, considering both education and changes in the social environment.

Keywords: childhood obesity; pediatric overweight; physical activity; activity and health; diet and obesity; bariatric surgery; obesity medication

INTRODUCTION AND PURPOSE

Obesity is a growing public health concern globally, with childhood obesity being a particularly alarming trend. The prevalence of obesity in children and adolescents has increased significantly in recent decades, with the World Health Organization reporting that the number of overweight or obese children and adolescents increased from 4% in 1975 to over 18% in 2016 [1]. This rise in childhood obesity has been linked to a variety of factors, including sedentary lifestyles, unhealthy dietary habits, and socioeconomic disparities [2].

Obesity is a persistent, recurring condition linked to excessive body fat that poses health dangers. The assessment of overweight, obesity, and severe obesity typically involves measuring height and weight, as well as calculating the height-to-length ratio in children under five and the body mass index in older children. These metrics should be evaluated using age- and gender-appropriate benchmarks [3]. They offer the benefits of being straightforward to perform, cost-effective, and flexible for measurement and evaluation.

The rise in childhood obesity can be attributed to a complex interplay of genetic, environmental, and behavioral factors. Sedentary lifestyles, characterized by increased screen time and decreased physical activity, are a major contributor to the obesity epidemic among children and adolescents. Additionally, the increased availability and consumption of energy-dense, nutrient-poor foods, often referred to as the "Western diet," has also played a significant role in the rise of childhood obesity [4].

Childhood obesity is associated with a wide range of adverse health consequences, both in the short and long term. Obese children are at an increased risk of developing various cardiovascular, metabolic, and psychological conditions, such as high blood pressure, type 2 diabetes, and low self-esteem [1] [5]. Furthermore, obese children are more likely to continue being obese as adults, leading to an increased risk of chronic diseases like heart disease and cancer. [6] Despite the availability of various treatment options, the management of childhood obesity remains a significant challenge. The complex and often multifactorial nature of the condition, with a variety of contributing factors, requires a tailored and comprehensive approach for each individual child. Furthermore, the social and psychological aspects of obesity, such as stigma and discrimination, can pose additional barriers to effective treatment and long-term success [7]. Future research and interventions should focus on developing more effective and sustainable strategies to address the root causes of childhood obesity, including environmental and societal factors. Implementing comprehensive, multifaceted programs that integrate public health initiatives, school-based interventions, and community-level support

may be crucial in effectively addressing the childhood obesity epidemic. These associations highlight the multifaceted health risks associated with obesity, emphasizing the importance of prevention and management strategies to address this growing public health issue [8]. As evidenced by the high persistence of obesity from childhood to adulthood, early intervention is crucial to mitigate the long-term health consequences of this condition. The aim of this study is to conduct a comprehensive review of obesity in children and adolescents presenting current methods of treatment.

MATERIALS AND METHODS

A review of the literature available in the PubMed and Google Scholar database was conducted. The search was performed by using the following keywords: “childhood obesity”, “pediatric overweight”, “physical activity”, “activity and health”, “diet and obesity", "bariatric surgery" and "obesity medication".

STATE OF KNOWLEDGE

Nonfarmacological treatment

Lifestyle-based interventions are the first line of defense against childhood obesity. These encompass a combination of dietary changes, physical activity promotion, and behavioral modifications [9]. Specific eating patterns, including skipping breakfast, irregular mealtimes, excessive snacking, insufficient fruit and vegetable consumption, and sedentary/inactive lifestyles, have been shown to contribute to the development of obesity [10]. However, there is a lack of agreement on the most effective structured dietary strategies for weight loss in children. In all children with obesity, a well-balanced low-energy diet should be implemented after consultation with a dietician [11]. The total daily energy value of the diet should be calculated with reference to the weight due for the child's height and can be further reduced by 200-500 kcal. Larger modifications in macronutrients may be needed in children with metabolic complications of obesity, especially insulin resistance or diabetes. Furthermore, carbohydrate modified diet was just as effective as a standard portion-controlled diet in obese children [12].

TABLE 1. Behavioral Treatment Strategies for Childhood Obesity [5].

Dietary approaches	Physical activity
1. Encourage intake of ≥5 servings of fruits and vegetables daily 2. Decrease intake of calorie-dense foods such as saturated fats, salty snacks, and high glycemic foods 3. Minimize intake of sugar-containing beverages 4. Minimize eating outside home and fast food in particular 5. Eat breakfast daily 6. Avoid skipping meals 7. Avoid watching TV, using tablets or smartphones while eating 8. Encourage drink water instead of sweetened drinks 9. Encourage read of food labels, choose products without added sugars 10. Encourage the family to eat together as often as possible	1. Decrease sedentary behavior such as watching television, surfing the Internet, and playing video games to <2h/d 2. Engage in fun and age-specific exercise that is appropriate to the individual's abilities 3. Increase intensity, frequency, and duration of exercise gradually as tolerated 4. More than 1 h of physical activity daily

However, a list of recommendations should always be established individually for each patient, taking into account their age, current needs and abilities.

Pysical activity

An important component of the treatment of obesity is increased physical activity [9].

Increasing physical activity is a crucial component in the treatment of obesity. Studies have shown that an individual's eating habits, physical activity levels, and sedentary behaviors directly influence their energy balance, which is associated with increased body mass index, body fat, and obesity [13]. Regular physical activity can provide metabolic benefits, such as

lowered blood pressure, reduced blood sugar levels, and improved insulin sensitivity. It also helps to enhance the lipid profile by decreasing total cholesterol and increasing HDL cholesterol. Additionally, physical activity has been shown to reduce proinflammatory markers and increase anti-inflammatory factors, even in the absence of concurrent dietary changes or other lifestyle modifications [14]. The effects of exercise may depend on the type of exercise (aerobic, resistance, mixed). For children with obesity, aerobic training (e.g. skipping, dancing, running, cycling) performed with moderate or moderate to intensive intensity, for 30-60 minutes a day, 3-5 times a week, is recommended [15]. Meta-analyses indicate that aerobic exercises are effective in improving various health outcomes for obese adolescents. These include lowering fasting insulin levels, reducing insulin resistance, decreasing body fat, and enhancing blood lipid profiles. Additionally, aerobic training can lead to reductions in overall body weight, BMI, and LDL cholesterol levels [16]. However, resistance exercises used to increase muscle strength, power and endurance are usually performed 1-3 times a week and may increase lean body mass. Mixed training incorporates aerobic and resistance elements into a single exercise protocol to take advantage of the benefits of each method.[17] The combination of aerobic and resistance training seems to be most effective in improving metabolic health and body composition in children and adolescents with overweight and obesity. This mixed training approach typically combines weight-bearing exercises targeting the upper and lower body, followed by a 20-30 minute period of moderate-intensity aerobic exercises, in a single workout session [18].

Psychological treatment

Obesity is a risk factor for psychosocial problems and psychiatric disorders [19]. It is important to have a proper psychological and/or psychiatric diagnosis at the very beginning of the interactions and/or psychiatric diagnosis [19]. Psychological and psychotherapeutic support are critical components in the treatment of childhood and adolescent obesity. Behavioral therapy has been demonstrated to be an effective intervention and can be used in conjunction with other approaches. Isolated treatment is ineffective due to the complex and multifaceted nature of obesity, with various factors contributing to its development and persistence. Adherence to medical recommendations in obesity management requires patients to possess a range of social and psychological skills, and psychological assistance aims to cultivate these skills to enable compliance with the recommended treatment plan [20]. Cognitive-behavioral therapy is meant to help children develop skills such as continuously monitoring their behavior, setting and managing goals, problem-solving, being assertive, and

regulating their emotions [20] [21]. It should be remembered that in the case of school-aged children, it is important to involve parents in their child's therapy, who can significantly influence dietary adherence and physical activity taking [21].

Pharmacotherapy treatment

Pharmacotherapy may be an option for children and adolescents with obesity who have not responded to intensive lifestyle interventions or require treatment for obesity-related complications. The drugs can be used in adolescents aged 12 years or older with a BMI equivalent to 30 kg/m2 or higher in adults. The only medication currently approved in Poland and Europe for people under 18 years of age is the human glucagon-like peptide 1 analogue-liraglutide. While there are two formulations of liraglutide available, only one is approved for the treatment of obesity (Saxenda). Liraglutide may be considered as a treatment option for adolescents aged 12 years or older who have obesity, defined as a BMI above the 95th percentile for their sex and age, and weigh more than 60 kg [22]. Liraglutide should be used in conjunction with a healthy diet and increased physical activity. Liraglutide operates by increasing insulin levels after meals in a way that depends on blood glucose levels, reducing glucagon secretion, slowing stomach emptying, and leading to weight loss through decreased appetite and food consumption[22]. Clinical trials have demonstrated the beneficial effects of liraglutide on weight loss and cardiometabolic health markers in adolescent patients with obesity. According to the study by Kelly et al., 43.3% of adolescent participants receiving liraglutide for 56 weeks experienced a weight loss of 5% or more, while 26% of the participants achieved a weight reduction of 10% or greater [23]. Pharmacotherapy for obesity should only be used in conjunction with lifestyle modification. It can only be conducted by clinicians experienced in the use of adjunctive drugs for the treatment of obesity. The potential benefits of liraglutide for adolescents with obesity must be weighed against the possible side effects. Most side effects of liraglutide are mild or moderate e.x. gastrointestinal disturbances (nausea, vomiting, diarrhea) [23].

Bariatric surgery

Patients should undergo at least 12 months of treatment, including dietary changes and increased physical activity, and potentially pharmacotherapy, before being considered for further treatment. The most suitable candidates are those who, despite these initial management strategies, still face health and life threats from excess weight or related conditions [24]. The qualification and preparation of the patient up to the age of 18 is based

exclusively on the cooperation of a multidisciplinary team working in units experienced in the surgical treatment of obesity in children, which should include:
a pediatrician;
a pediatric surgeon;
a nutritionist;
a psychologist or mental health specialist;
a treatment coordinator [24].
Prior to the procedure, patients and their families must complete extensive education on the surgery process, recovery period, and lifelong nutritional and medical follow-up required. Bariatric surgery for adolescent obesity has been shown to lead to substantial and lasting weight loss, as well as improvements in obesity-related health conditions like type 2 diabetes, dyslipidemia and non-alcoholic fatty liver disease [24]. Experts recommend that the safest and most effective bariatric surgery options for children is sleeve gastrectomy but gastric bypass and single anastomosis duodeno-ileal bypass procedures are also performed.

Summary

A combination of lifestyle modification, psychological support, and pharmacotherapy can be an effective approach to manage pediatric obesity. Bariatric surgery may be considered for select adolescents with severe obesity who do not respond to other interventions. Treatment should be tailored to the individual child's needs and circumstances, and a multidisciplinary team approach is recommended for optimal outcomes. Further research is still needed to develop additional pharmaceutical options, refine surgical techniques, and better understand long-term outcomes in this patient population. Clinicians should be aware of the latest treatment guidelines and work closely with families to provide comprehensive, individualized care for children and adolescents struggling with obesity [25] [26] [27].

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Statement of the authors' contribution

Aleksandra Kiełczewska: Conceptualization, Writing-rough preparation

Grzegorz Szcześniak: Methodology, Investigation Resources

Anna Kiełczewska: Formal analysis, Visualisation, Writing-review and editing

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