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Correlation between depression and obesity in children and adolescents

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ABSTRACT

BACKGROUND. Obesity and depression are both major problems of health in almost whole world. Moreover, it is predicted that population of patients of mentioned diseases are going to growth. While these conditions are becoming bigger problem, it is important to mark their impact on childen. Results of illnesses in childhood are associated with many longlasting complications.

AIM. The aim of this review was to evaluate the bidirectional relationship of depression and obesity in children and adolescents and to underline their influence on health and proper development. Moreover authors were aiming to highlight the importance of physical activity and appropriate diet in the prevention and treatment of mentioned diseases.

MATERIAL AND METHODS. A narrative review of the available literature was conducted. PubMed and Google Scholar databases were used for the research. The following keywords were searched: „depression“, „children“, „obesity“, „anxiety“, „adolescent“, „biological mechanisms“, „depressive episode“, „lifestyle“.

RESULTS. There are many common factors occuring in pathophysiology of obesity and depression. It is important to underscore that patients require treatment involving both illnesses and they should not be treated separately. Parents play a crucial role during treatment and they have to teach their children healthy habits. Healthy lifestyle is essential in treating these conditions.

CONCLUSIONS. Prevention should be the main focus for medical professionals treating obesity and depression. It is important to observe and react in early stages of mentioned conditions. Studies also show the important role of parents and lifestyle education and their impact on development of illnesses.

KEY WORDS: Depression, children, adolescents, childhood, obesity, overweight, mental illness, prevention, physical activity, lifestyle intervention

INTRODUCTION

Over the past three decades the amount of diagnoses of obesity in children and teenagers increased three times (1). The consequences of rised body mass and body adipose tissue are well tested and known. However actions taken worldwide to reduce the scale of the mentioned problem are insufficient. Moreover predicted increase in overweight and obesity appears to be a growing problem of the future. In the same period of time, the burden of psychiatric conditions doubled (2). Depressive disorders in children might disturb widely understood well-being, decrease happiness and become serious burden on patients, their close ones and healthcare (3). Similarly to obesity, depression is also predicted to increase its occurrence in the future (4). During childhood and adolescence human is developing many crucial psychological, physiological and social abilities. This period of growing is very important for future life and health condition. Therefore, well-known dangers in appropriate development aligned to obesity and depression make the diseases a global crisis (5).

CHILDHOOD OBESITY

Medical definition of childhood obesity is determined as body mass index (BMI) at or above the 95th percentile for age and sex, while BMI between the 85th and 95th percentile for age and sex is defined as childhood overweight (6, 7). It occurs when both fat tissue mass and size and number of fat cells are increased, which is caused mainly by higher energy intake than energy use (7).Children with obesity are at higher risk of developing health conditions such as type 2 diabetes, non-alcoholic fatty liver disease (NAFLD), hypertension and gynecologic disorders (7-9). Moreover depression, low self-esteem, social discomfort, and as a result, the decreased quality of life are also obesity-related consequences (10). Correspondingly with worldwide study, in 2021 11.2% of individuals aged 5–24 years were overweighted and 6.9 % were living with obesity, equating to 493 million children and adolescents. This numbers are predicted to grow accordingly to 14.1% and 15.6% by 2050 (1).

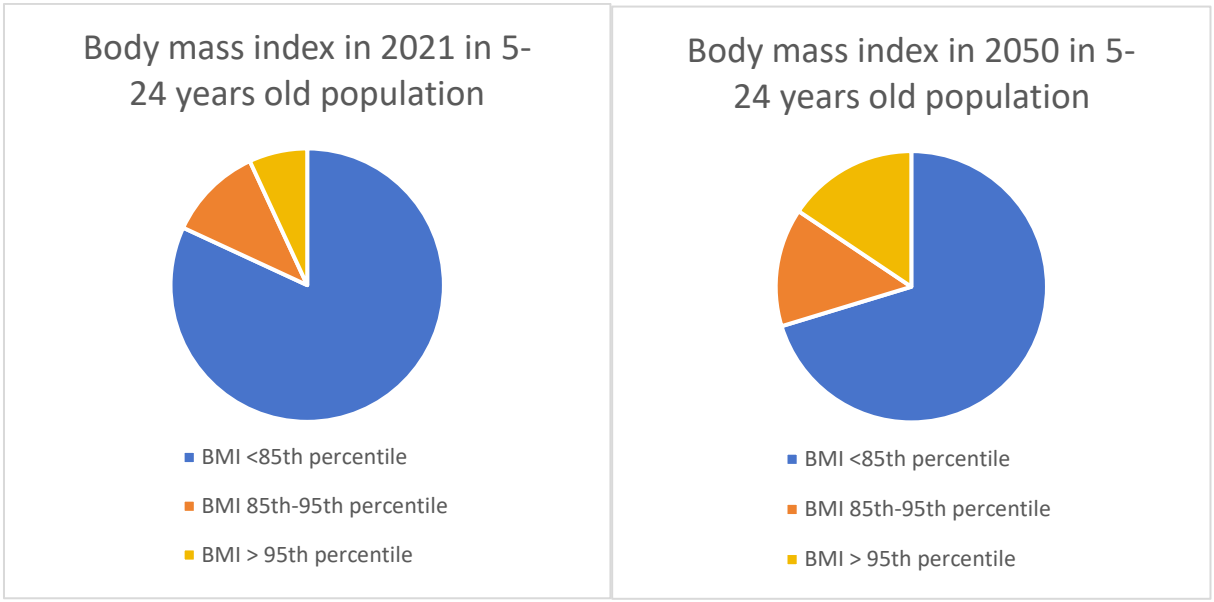

Figure 1. Occurrence of particular Body Mass Index ranges among children population worldwide (A) in 2021 and (B) prediction for 2050

DEPRESSION IN CHILDREN

Depression is a mental health condition, which can cause suffering and rises the risk of premature death from physical illness and suicide (11, 12). A number of cases of depression begin in childhood and increases during adolescence (13). Main health complications for children and adolescents suffering from depression are impaired psychosocial development due to underachievement in school, withdrawal from family or friends relationships, increased risk of substance use disorders, self-harm and suicidal behaviors (14, 15). Depression occurs in children and teenagers worldwide, its prevalence differs depending on the stage of symptoms. Mild depression occurs at 21.3 %, moderate depression at 18.9 %, and major depression at 3.7 % (13). The depressive episode averagely lasts several months and its probability to relapse in 5 years totals 70% (16). In case of described mental illness the growth in prevalence is being predicted (17).

CONNECTION BETWEEN OBESITY AND DEPRESSION

Bidirectional relationship between obesity and depression

Both mental and physical health has influence on human well-being (18). It is proven that neglect of one aspect can disturb the other. Previous studies have indicated connection between depressive symptoms and obesity in adult patients (19). Also in the group of young patients it was proven that obese children are at higher risk of developing mental illnesses, including depression, aggressive behavior or anxiety, while mood disorders in children increase the probability of developing obese disease (20-22). It is worth noting that overweight did not indicate the same effect on mental health (23). Another important aspect of their co-existence is their common etiology, concerning both biological mechanisms and social conditions. Studies show that children, whose parents are divorced, are more likely to develop obese disease (24). Also prevalence of depression is higher in children with divorced parents (25). Researchers indicate that experiencing domestic or peer violence is recognized risk factor of promoting depressive disorder or obesity in later life (26, 27). It concerns both sexes, but is more underlined in females. Eating habits and frequency of physical activity during growth and development also plays a major role in prevalence of described problems. For example watching TV few hours per day or using computer significantly raise the risk of obesity, which is not reduced by diet or exercise (28, 29). Prevalence of depression is also elevated while using computer, tablets and social media (30).

Biological mechanisms

There are many common biological paths in patomechanism of depression and obesity. Depression causes activation of hypothalamic-pituitary-adrenal axis, supporting hyperfunction of the adrenal cortex and therefore supporting production of cortisol (31). Increased level of this stress hormone plays a crucial role in growth of adipose tissue (32).

Adipokines, such as leptin, are another factor, which should be taken under consideratrion when describing bidirectional relationship between elevated body mass index and depression. Studies showed proportional correlation between the leptin level and adipose tissue mass (33). Notwithstanding, scientific findings on adipokines levels and their changes by treatment of depression are inconsistent. Some authors report decrease in leptin concentration (34), while others find its level rising (35). In order to inaccuracies, broader evaluation is needed.

Another pathway of etiology of depression concerns tryptophan and its lower plasma availability (36). This amino acid plays crucial role in serotonin synthesis as a substrate, however most of tryptophan is metabolized via the kenurenine process, which uses enzyme indoleamine 2,3-dioxygenase (37). Maes et al. showed that pro-inflammatory substances, such as interleukin 6 (IL-6) and tumor necrosis factor-alfa (TNF-alfa), increase IDO activity, therefore decreasing amount of tryptophan possible to use in serotonin synthesis (38). Moreover, the relation between increased level of leptin, c-reactive protein (CRP) and interleukin 6 (IL-6) and higher body mass index was shown (35).

It is worth paying attention to the action of palmitate, one of the fatty acids. It has been proven that palmitate cause impairment of signal from leptin receptor. Therefore plasma level of palmitate correlates positively with weight gain and depression in patients (39).

TREATMENT

Interventions in lifestyle habits are well-known and widely used as first line of treatment in many diseases. Some conditions are managed only by dietary adjustments or proper physical activity. Similarly, obesity can be treated effectively by lifestyle modifications (40, 41). Concrete changes in various fields might reduce body mass, stabilize hormonal balance, and improve immune system and in consequence have positive impact on metabolism (41). Zhou et al. showed that lifestyle interventions such as changes in eating pattern, relaxation, many kinds of movement and education on these topics significantly reduced depression, greater in adolescents and obese participants (18). Moreover, named modifications while treating obese disease are also effective in targeting mental disorders and improving well-being (18). These interventions result in significant change in the course of depression (42).

Organizing appropriate and safe surroundings around children is another important factor, which has direct effect on reducing risk of obesity (2). Not only healthy lifestyle, but also calm and supportive environment are fundamental for appropriate development in diverse stages (7).

Healthy habits, acquiring new skills, establishing social relationships and academic development are possible to establish in the right environment. Therefore, warm, safe household, where participants of the family can communicate with each other are crucial for preventing and treating both depression and obesity (7, 43).

Another necessary point of treatment should be regulation of metabolic-inflammatory disruptives, as it might improve outcomes in depressive episodes (44). It is important to underline that inflammation can be decreased by reducing amount of adipose tissue in body.

CONCLUSIONS

Prevalence of not only depression but also obesity is predicted to grow significantly (1, 17). Therefore, it is becoming a major global health problem. It is important for health organizations to address that and create guidelines to improve current situation.

Their co-existence is important in clinical practice. Both health conditions can contribute to development of multiple illnesses, such as type 2 diabetes or cardiovascular disease (45, 46). Moreover, life quality is significantly decreased when patient suffer from depressive disorder and obesity, than if these diseases occur separately (47). Due to mentioned facts, it is relevant to search for excessive weight in patients with depression, and to examine obese children for symptoms of eating disorders or depressive syndrome (35).

Children should learn healthy lifestyle habits such as proper eating choices and regular physical activity, when they are young (7). If parents will not pay attention to childrens' eating habits, children will gain weight and enhance their risk of being obese as adults (29). To maximize effectiveness of interference in developing habits, various social, psychological and physical factor should be taken into consideration (42). Parents, children and medical proffesionals have to work together to increase quality of life at the moment and in the future. Interventions and management focusing on young patients are essential, due to fact that this stage of life is crucial for human growth and development (48).

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