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Modern Views Of Obesity –Comorbidity

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ABSTRACT

Obesity has become an epidemic among children and adolescents around the world. To date, of particular interest is the study of the mechanisms of development of metabolic syndrome, especially associated with impaired iron metabolism. The simultaneous occurrence of diseases of two different directions, namely obesity and anemia, cannot be considered a coincidence. Numerous studies have shown that increased serum ferritin levels are associated with the development of metabolic syndrome. This article provides an overview of current studies of neuropsychological and autonomic changes in adolescents as a result of metabolic syndrome affecting the central nervous system, as well as electroencephalographic and ultrasound Doppler changes, the relationship between metabolic syndrome and serum ferritin levels. The psychoemotional and mnestic-intellectual changes that develop as a result of metabolic syndrome in adolescents are widely covered.

KEYWORDS

Metabolic syndrome, adolescents, neurological changes, neuropsychological changes, paraclinical studies, ferritin.

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INTRODUCTION

Obesity is a chronic multifactorial disease that develops under the influence of both hereditary and external factors, which is characterized by the accumulation and development of excess body fat. Today, the prevalence of childhood obesity in many countries has become an urgent and serious problem in the public health system, both local and foreign specialists. (WHO, 2018). Obesity among children and adolescents has become a growing epidemic. This figure is growing in almost all regions of the world, doubling every three decades. In recent years, according to statistics, the overall incidence among children, especially adolescents, has been increasing. In developed countries, 25% of adolescents are overweight and 15% are obese [16,17]. Among adolescents, this figure is 25% overweight and 15% obese (24). According to the National Health and Nutrition Examination Survey (NHANES) in 2009-2012, 33.0% of children in the United States were overweight, 35.7% were obese, and 12-19 years old were boys. 20% of children and 18.9% of girls are obese [36]. In Europe, 20% of children and adolescents are overweight, and one third of them are obese. According to the data, 30-50% of children diagnosed with obesity are overweight even at an older age. Obesity is a multifactorial disease, the development of which depends on genetic predisposition and environmental factors [27]. Obesity in children and adolescents in Uzbekistan is 1.5-2 times higher than in adults, which confirms the urgency of this problem in our country. During the study period, the prevalence of childhood obesity in the country was 1.5-2 times higher than among the adult population, in 2012 - 50.5, in 2013 - 59.4; 2014 and in 2014 - 65.7%, and for 3 years this figure was 30%. was observed [19,20].

MATERIALS AND METHODS

Comorbidity is a condition of two or more chronic diseases that are pathogenetically related to each other in one patient [14]. There is no consensus on the development of metabolic syndrome. There are internal and external causes, a genetic predisposition to internal causes, hunger and satiety in the hypothalamus. Factors such as disturbances in the process of sensory control, hormonal disturbances, disturbances in the synthesis of adipocytokines in adipose tissue, and a person's age are included. External factors include overeating (diet according to the body's needs), physical inactivity and chronic stress. Additional factors that lead to obesity in children include: unbalanced or inadequate maternal nutrition during pregnancy, breastfeeding cessation early, before 6 months, premature feeding of children, insufficient intake of fruits and vegetables in the daily diet, excessive sugar intake, lunch in front of the TV are among them. The study of predictors of overweight in children and the risk of their development improves the primary prevention of this pathology in children. Metabolic disorders that develop in childhood obesity not only persist throughout life, but also program the formation of metabolic disorders in the next generation. Therefore, for the timely prevention of clinical manifestations of obesity and related conditions, it is important to identify conditions that trigger the development of hormonal and metabolic disorders leading to the development of overweight [21]. The presence of symptoms of metabolic syndrome (MS) in at least one of the parents increases

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the risk of developing abdominal obesity [18]. It is known that there are genetic factors, family forms in the development of obesity, in which the heredity coefficient is 25%, which indicates a very high influence of genetic factors on the development of the disease. The risk of obesity in an obese child for both parents is 82.3%, unless the mother is obese, 51.7%, and the father 38.9%. The risk of obesity in the absence of parental obesity is only 7.6% [11].

Diagnosis of MS in the early stages, especially in childhood and adolescence, is of great clinical importance, since it is a reversible process, and with adequate treatment, at least it can reduce its main symptoms, prevent complications and improve quality of life. Obesity is diagnosed clinically on the basis of anthropometric parameters. There is enough research on the use of BMI - body mass index, that is, height, weight, waist circumference, hip circumference. The main role in the diagnosis of obesity is the calculation of anthropometric parameters (growth SDS, growth rate, SDS growth rate) and the growth curve taking into account the child's length and age. According to the WHO, obesity in children and adolescents SDS +2, SDS ammunition is calculated from +1 to +2.

MS is asymptomatic for a long time, and changes in the body begin to form long before the onset of clinical manifestations. MS is a reversible process, the severity of its complications indicates the need for early diagnosis, timely detection and adequate treatment. Cognitive disorders in MS are not only a medical, but also a social problem of our time, and thinking disorders can reduce a person's quality of life and even lead to dementia and social maladjustment. Obesity has negative physical and psychological consequences for children and adolescents, directly worsens the health of the child and reduces the level of education and quality of life. In addition to adversely affecting a child's physical health, being overweight also affects his or her mental health, often leading to psychological and emotional problems resulting from social stigma. In society, they are perceived as "unhealthy", "insufficiently working at school", "inexperienced", "lazy" children. These social problems can lead to low self-esteem, poor quality of life, high levels of depression and suicidal ideation. Development of pathogenetic methods based on the identification, correction and prevention of the mechanisms and causes of the development of mnestic-intellectual disorders in patients with MS. At the present stage of development of medicine, the indicator of the quality of life is the main key and is the basis of general health and well-being of a person. The presence of significant changes in the psycho-emotional state of overweight children indicates the influence of the face on the quality of life of the child. According to Ventegodt S., Merrick J., the quality of life in society is assessed as an individual activity, i.e. work, social activity, family life, as well as physical, mental and intellectual characteristics of a person. The effects of obesity on mental health have been shown to be associated with obesity and depression in adolescents. [44]. Scientific studies have shown that being overweight negatively affects health-related quality of life [29,1,8,3,4,5,8,23,31,36,37,40,48]. Obese patients are mainly in a state of chronic psycho-emotional stress [6]. Latent depression is at the root of episodes of appetite and bulimia, in which case food is the only source of positive emotions. Psychological disorders associated with obesity impair quality of life and are considered a condition that requires

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correction. Mental disorders such as depression and anxiety in MS are studied in MS. It has a unique pathogenetic mechanism in the monoaminergic and limbic-hypothalamic-pituitary-adrenal systems of the central nervous system, which are also found in obesity and depression [11]. Maslova surveyed 136 children in her study and found that obese children experienced emotional instability, anxiety, dependence on others, insecurity, low self-esteem, and decreased quality of life in terms of health, happiness, appearance and sleep. The method of studying the quality of life complements the traditional data of clinical, laboratory and instrumental examination and allows one to obtain a wide range of information about his physical, psychological and social activity. The literature provides information on the impact of obesity on the psychological health and quality of life of children, but the authors often relied on the subjective opinion of parents about their children. It is known that one of the members of the MC that mainly affects the face is the brain. Cognitive impairment is not only a medical problem, but also a modern social problem, and it is known that the violation of the thought process leads to a significant decrease in the quality of life. Today, cognitive impairment is an urgent medical and social problem of modern society. -space gnosis and violations of constructive-spatial practice significantly reduce the quality of life [7]. However, to date, the identification of the causes and mechanisms of the development of cognitive impairments in MS, the use of pathogenetically grounded methods of prevention and treatment of mnestic-intellectual disorders remain controversial.According to the research of Yu.V. Naugolkhin (2007), all cognitive impairments are characteristic of MS, but in this case, mainly short-term impairments of auditory-speech memory were revealed. The revealed pathological changes were more pronounced in children with lipid metabolism disorders, such as hypertriglyceridemia and depletion of high-density lipoproteins. Comparative analysis of psychovegetative changes in the group of children with the identified metabolic syndrome and with the risk of metabolic syndrome development showed that their compensatory mechanisms are in a state of increased stress.

RESULT AND DISCUSSION

The prevalence of cognitive impairment in the population is very high. According to a study by Russian scientists, there is evidence of memory loss in 95% of patients diagnosed with obesity, as well as the presence of varying degrees of cognitive impairment on the short-term mood assessment scale, including obesity and cognitive changes in different age groups. In addition, cognitive screening tests have shown moderate cognitive decline in overweight middle-aged people. Besides metabolic, hormonal and psychological changes, obesity and MS are associated with difficulties in social adaptation due to changes in appearance. Such children are often discriminated against by peers in the process of play and learning, which leads to restrictions in social communication. Disorders of emotional sensations are accompanied by vegetative changes, which, in turn, lead to the formation of adaptive disorders [14]. Chervinskikh with co-authors suggested that the deterioration of clinical and laboratory parameters in MS and fatigue of control systems will lead to a violation of the adaptive capabilities of the organism. It is emphasized that social adaptation and vegetative stagnation in adolescent MS depend on the severity of clinical and metabolic changes and the sex of the child,

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which must be taken into account when carrying out therapeutic and rehabilitation interventions [25]. According to G. Reven, autonomic disturbances in MS lead to insulin resistance and compensatory hyperinsulinemia as a result of activation of the sympathetic nervous system. The interrelated pathogenetic links between obesity and sympathetic nervous system (SNS) activity are complex. Although this is an undeniable condition, the mechanisms by which SNS activity increases in obese people are not well understood. The development of insulin resistance is associated with stagnation of body weight, which, on the one hand, limits the accumulation of fatty deposits, and on the other, leads to increased thermogenesis by increasing the activity of the SNS. The main cause of arterial hypertension observed in obesity is associated with increased SNS activity. In general, according to modern concepts, all the main factors arising from a violation of the metabolism of adipose tissue and associated with an increase in blood pressure are due to the activation of the sympathetic nervous system. Although much evidence has been obtained confirming the effect of autonomic changes on the formation of metabolic syndrome, there is still no general agreement regarding the nature of autonomic disorders and their role in clinical manifestations in MS, reducing their inhibitory effect on the SNS on the centers of the brain stem, which leads to an increase in activity of the central sympathetic nervous system. In the physiological state, this mechanism is under control, and in the case of hyperinsulinemia, it leads to a stable activation of the sympathetic nervous system [12].In particular, there is no consensus on the main pathogenetic mechanism of the origin of obesity - insulin resistance, dysfunction of visceral adipose tissue, endothelial dysfunction, autonomic disorders, or any other mechanism. Despite the large amount of information in the literature on the causes of SNS hyperactivity, the mechanism of this condition is still unknown. Studies assessing autonomic changes in insulin resistance are few and far between. The relationship, nature and role of autonomic changes with MS in the clinical picture of MS are not fully understood.

To date, the study of the mechanisms of development of metabolic syndrome, especially iron metabolism, is of particular interest in modern medicine, and the simultaneous occurrence of two diseases in one patient, such as obesity and anemia, cannot be considered a coincidence [28]. Each of these pathological conditions, in turn, has socio-economic significance in modern society, and not only in medicine. On the one hand, iron is one of the most important elements in the normal structure and functioning of the cell, its growth and proliferation, and on the other hand, excess iron is a strong catalyst for lipid oxidation, which can lead to oxidative stress and cell damage [42]. It has been shown that many tissues and organs affect the neurons of the cortex, as well as higher nervous activity and emotional personality. In the brain, iron is involved in impulse transmission and myelination of nerve fibers and affects the function of the hypothalamus (30). It has been shown that an increase in serum ferritin level is associated with the development of metabolic syndrome (50). Elevated serum ferritin levels may be associated with metabolic syndrome or may be used as a screening biomarker in the early stages of the disease. In addition, high ferritin levels have been shown to increase waist circumference, increase glucose levels, reduce low-density lipoprotein levels and increase the risk of triglycerides, which are components of

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metabolic syndrome [51]. Based on research by Hamalainen and colleagues, MS showed an increase in serum ferritin levels, as well as ferritin and triglyceride levels, abdominal obesity, and hyperglycemia [40]. Ferritin is not only an indicator of iron deposition in the body, but also an acute protein associated with inflammation in the body, which is important in MS. Therefore, ferritin cannot be regarded as an indicator of iron metabolism in the body [45]. According to modern concepts, iron deficiency in obesity is considered an inflammatory process that develops as a result of disruption of neuronal, hormonal connections and lipolysis between adipocytes, which leads to active secretion of adipose tissue adepokines [49].

CONCLUSION

Impaired absorption of iron by enterocytes of the small intestine in obesity is one of the main mechanisms for the development of iron deficiency. The relationship between iron deficiency and obesity has not been fully studied, with the development of cognitive impairment in developing metabolic syndrome, the study of possible mechanisms of cognitive impairment, early diagnosis and prevention of early detection of carbohydrate metabolism in adolescents. It is not fully understood whether changes in iron levels in obesity are a manifestation of functional changes or a factor in the development of true iron deficiency. [26]. In addition, studies of the relationship between these two comorbid conditions in adolescents and children are practically absent; not only timely diagnosis of this condition, but also its importance in the rehabilitation of such patients is relevant. Bolotova N.V., Raigorodsky Yu.M. and Posokhova N.V. (2016) reported changes in brain bioelectrical activity based on EEG results in 77% of children diagnosed with obesity. According to the results of this study, the frequency of the alpha rhythm in 20% of children is moderate, the slowing of the alpha rhythm. When analyzing the amplitude of the alpha rhythm, 30% of obese children were diagnosed with a low amplitude, and 20% - with a high amplitude alpha rhythm. Changes in mid-frequency beta rhythms were found in 29% of controllers, and low-frequency and high-frequency changes in beta rhythms were found in 35% of patients. Only 36% of children with normal EEG amplitude were identified. It can be seen that in obesity, from one third to a quarter of EEG cases are definitely pathological changes, and this examination plays an important role in the early detection and prevention of complications of metabolic syndrome. Another symptom of MS is endothelial dysfunction. Insulin resistance and endothelial dysfunction, which are primary and secondary, are still controversial issues. and further reduce insulin sensitivity, leading to a deepening of the pathological condition [11]. Currently, the study of the structural and functional state of blood vessels in adolescents with metabolic syndrome is of great interest; timely diagnosis of changes in the vascular wall can prevent hypertension and early drug correction. According to N.V. Bolotova (2014), the stiffness of the vascular wall in MS in children is 3.5 times more common than in children diagnosed with normal obesity, therefore, the presence of cardiometabolic risk in childhood obesity indicates the importance of studying arterial stiffness. The relationship between childhood obesity and arterial stenosis has not been clearly understood. The urgency of this problem confirms the social significance of the situation, which generalizes the concept of MS in conditions when the prevalence of MS is increasing, and the impact on adequate life

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expectancy and mortality among young people. Therefore, increasing vascular tone and early correction and prevention of metabolic changes during this period will be an important scientific and practical problem in the diagnosis of MS markers. Despite the available data on MS, individual research methods, etiology and pathogenesis, as well as the entire syndromic complex, are widely discussed. Aspects remain open. When diagnosing metabolic syndrome, it is unclear which criteria should be included in a particular component. Adolescents need careful screening to effectively prevent cognitive impairment in MS.

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