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Anxiety level in overweight and obese children

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Purpose — to evaluate personal and situational anxiety levels in overweight and obese children.

Materials and methods. 153 children (72 girls and 81 boys) aged 12–17 were involved in the study at the Odesa Regional Children's Clinical Hospital. Anthropometric indicators (weight, height, body mass index (BMI)) were assessed taking into account the sex and age of children. Based on BMI values, 3 groups were selected: 1 — children with a body weight corresponding to age and gender — 47 persons (Control); 2 — children with excessive body weight — 50 persons (Overweight); 3 — children with obesity — 56 persons (Obesity).

The state of personal and situational anxiety was determined using the Spielberger–Khanin questionnaire. Statistical data analysis was carried out using packages STATISTICA 12.0, MedCalc 20.0, Microsoft EXCEL 2003.

Results. In children with obesity, the most common comorbidities were biliary dyskinesia (14.28%), arterial hypertension (10.52%), skin infections 4% and obstructive sleep apnea syndrome 2%. In the studied groups of children, the level of anxiety increased in proportion to the degree of increase in body weight. Personal anxiety in children with obesity compared to control was noted at a higher level — 50.1±1.04 and 30.27±0.98, respectively (χ^2=49.9, p=0.0001). Situational anxiety also increased in children with obesity, but the differences were expressed to a lesser extent — 38.94±0.74 and 33.91±0.93 (χ^2=5.49, p=0.019).

Conclusions. The obtained results indicate the feasibility of further study and monitoring of the psycho-emotional state and quality of life of overweight and obese children and adolescents for individual psychological support and correction of psycho-emotional disorders.

The research was carried out in accordance with the principles of the Helsinki Declaration. The study protocol was approved by the Local Ethics Committee of participating institution. The informed consent of the patient was obtained for conducting the studies.

No conflict of interest was declared by the authors.

Keywords: personal anxiety, situational anxiety, children, obesity.

Рівень тривожності в дітей з підвищеною масою тіла та ожирінням

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Мета — визначити рівень особистісної та ситуативної тривожності в дітей з надмірною масою тіла й ожирінням.

Пацієнти та методи. До дослідження в Одеській дитячій клінічній лікарні залучено 153 дитини (72 дівчинки і 81 хлопчик) віком 12–17 років. Оцінку антропометричних показників, яка включала масу і довжину тіла, індекс маси тіла (ІМТ), проведено з урахуванням віку та статі. Залежно від значень ІМТ дітей поділено на три групи: 1-ша — діти з масою тіла, що відповідає віку та статі; 2-га — діти з надмірною масою тіла; 3-тя — діти з ожирінням. Стан особистісної та ситуативної тривожності оцінено за допомогою опитувальника Спілбергера–Ханіна.

Результати. У дітей з ожирінням серед коморбідних захворювань частіше зустрічалися біліарна дискінезія (14,28%), артеріальна гіпертензія (10,52%). Інфекції шкіри відмічалися в 4% підлітків, як і синдром обструктивного апное під час сну — 2%. У досліджуваних групах дітей рівень тривожності зростав пропорційно до ступеня збільшення маси тіла. Особистісна тривожність у дітей з ожирінням щодо контролю відзначалася на вищому рівні — відповідно 50,1±1,04 і 30,27±0,98 (χ^2=49,9; p=0,0001). Ситуаційна тривожність також підвищувалася в групі дітей з ожирінням, але відмінності були виражені меншою мірою — 38,94±0,74 і 33,91±0,93 (χ^2=5,49; p=0,019).

Висновки. Отримані результати свідчать про доцільність подальшого вивчення психоемоційного стану та якості життя дітей з надмірною масою тіла й ожирінням для індивідуального психологічного супроводу та корекції психоемоційних розладів.

Дослідження виконано відповідно до принципів Гельсінської декларації. Протокол дослідження ухвалено Локальним етичним комітетом зазначеної в роботі установи. На проведення досліджень отримано інформовану згоду пацієнтів.

Автори заявляють про відсутність конфлікту інтересів.

Ключові слова: особистісна тривожність, ситуаційна тривожність, діти, ожиріння.

Introduction

Overweight and obesity are defined as pathological or excessive accumulation of fat that poses a health risk. This is a multifactorial disease caused by improper nutrition, insufficient physical activity, sedentary behavior, psycho-social factors, medications, endocrine disorders, monogenic diseases/genetic syndromes. The prevalence of childhood obesity is reaching alarming levels in many countries and is an urgent and serious problem. One in three children is overweight and one in ten is obese — this is European statistics. Between 1975 and 2016, the proportion of children and adolescents aged 5 to 19 who are overweight or obese has more than quadrupled worldwide, from 4% to 18.5%, and is reaching alarming levels in many countries [3,4,7,11]. The prevalence of obesity in the United States was 12.7% among children aged 2 to 5 years, 20.7% among children aged 6 to 11 years, and 22.2% among children aged 12 to 19 years [4]. According to the results of the analysis of the dynamics of obesity prevalence, as well as the levels of the incidence of obesity among the child population in Ukraine over the past decades, a significant increase in the prevalence of obesity was established both among the entire child population (by 1.6 times) and in its various age groups. The highest rates of growth are observed

in the age group of children 15–17 years old — by 3 times [15,18]. Conditions associated with obesity include high blood pressure, high cholesterol, type 2 diabetes, breathing problems such as asthma and sleep apnea, and joint problems [9,13].

Obesity develops due to a combination of exposure to the child's unhealthy environment and biological factors and leads to inadequate behavioral responses. Most researchers believe that children with excessive body mass and obesity have psychological and behavioral disorders, and poor ability for social adaptation [14]. They are more egocentric, less obedient and more irritable and have low self-esteem. A child's emotional state significantly affects their eating behavior, and food receptivity is positively correlated with emotional problems and body mass index (BMI) [17]. All this indicates that the psychological state of obese children plays an important role in the formation of eating habits and behavioral reactions. Currently, the details of the connection between obesity and psycho-emotional disorders in children, including anxiety, have not been sufficiently studied. Anxiety as an emotion is characteristic of all people and is necessary for the optimal adaptation of a person to the surrounding world. On the other hand, anxiety as a part of a person's personality is a violation of their personal development and interferes with a full life in society. Obesity in childhood leads to some psychological and social complications, which primarily include the formation of psychological stress, low self-esteem, body dissatisfaction, depression, the appearance of suicidal thoughts, loss of control over eating, unhealthy and extreme behavior concerning weight control, disruption of social relationships, stigmatization and reduction of health-related quality of life [16]. According to literature data, mental disorders are recorded in 40.6% of obese children, in the structure of which anxiety disorders predominate [8]. Correction of the identified features, along with lifestyle changes, should become an integral part of the complex non-pharmacological methods of obesity therapy.

The ***purpose*** of the study — to determine the level of personal and situational anxiety in overweight and obese children for individual psychological support and correction of psycho-emotional disorders.

Materials and methods of the research

The research was carried out in secondary schools of Odesa. 153 adolescents aged 12–17 years were included in the study: 72 girls (47.06%) and 81 boys (52.94%), average age 15±1.4 years. First, anthropometric indicators were assessed: body weight and length, body mass index (BMI) calculation, the assessment was carried out taking into account age and gender. According to the evidence-based clinical guideline «Obesity in children» and the standards of medical care «Obesity in children» (2022), obesity was determined based on BMI of more than 95 percentiles, and overweight based on a BMI of more than 85 percentiles [13]. The study was conducted following Good Clinical Practice standards and the principles of the Declaration of Helsinki. The study protocol was approved by the Local Ethics Committee of the Odesa Regional Children's Clinical Hospital (ORCCH). Written informed consent was obtained from all 153 participants before inclusion in the study. BMI assessment made it possible to distinguish 3 groups of teenagers: the Group 1 — with normal body weight, 47 people (30.71%); the Group 2 — overweight, 50 teenagers (32.68%); the Group 3 — with obesity, 56 people (36.61%).

The level of personal and situational anxiety was assessed using the questionnaire survey (Spielberger–Khanin test). All respondents filled out the Spielberger–Khanin questionnaire in comfortable conditions in the presence of teaching staff. The questionnaire consists of 40 questions: 20 questions characterize situational anxiety, and 20 questions characterize personal anxiety. The respondents were asked to answer questions and indicate how they feel at the moment (questions 1–20) and how they usually feel (questions 21–40). Each answer was evaluated depending on the selected statement in 1, 2, 3, and 4 points. The level of situational anxiety was calculated according to the formula:

$$SA=\Sigma сп-\Sigma со+50,$$

where SA is an indicator of situational anxiety; Σsp — the sum of points for direct questions (3, 4, 6, 7, 9, 12, 14, 15, 17, 18); Σso is the sum of points for oppositely polar questions (1, 2, 5, 8, 10, 11, 13, 16, 19, 20).

To calculate the level of personal anxiety, the formula was used:

$$PA=\Sigma op-\Sigma oz+35,$$

where PA is an indicator of personal anxiety; Σop is the sum of points for direct questions (22–25, 28, 29, 31, 32, 34, 35, 37, 38, 40); Σoz is the sum of points for oppositely polar questions (21, 26, 27, 30, 33, 36, 39).

In the general interpretation of indicators, the following approximate anxiety scores were used: low — up to 30 points inclusively, moderate — 31–44 points, and 45 and more — high [10].

Statistical data analysis was carried out using packages STATISTICA 12.0, MedCalc 20.0, Microsoft EXCEL 2003 with AtteStat 12.5 integration, and SISA online calculator (Simple Interactive Statistical Analysis — https://www.quantitativeskills.com/sisa/). Average sample values of quantitative traits are given in the text as M±m, where M is the selective average, and m is the error of the average. Proportions (percentages) are presented with 95% confidence intervals (CI). The study of the relationship between pairs of discrete qualitative features was carried out using the analysis of paired tables of connectivity, where the values of Pearson's Chi-square statistic (χ^2) and the achieved level of significance (p) were evaluated. One-way ANOVA was used to assess the significance of the difference between the means in the comparison groups.

Results of the research and discussion

A thorough medical and family history was critical to the assessment of obesity in children, Family history included information on obesity, bariatric surgery, type 2 diabetes, gestational diabetes, dyslipidemia, hypertension, nonalcoholic fatty liver disease, cirrhosis, sleep apnea, death from myocardial infarction, stroke. The main causes of overweight and obesity in the subjects were found to be an increased intake of energy-dense foods that are high in fat and sugars n=74 (69.8%), physical inactivity n=32 (30,4%), which is most often associated with sedentary behavior n=26 (24.5%), and individual's genetic background — increased body weight in one or two parents n=49 (46.2%).

Biliary dyskinesia was the most common comorbidity in children from the Group 3 (14.28%; 95% CI 4.91–23.08%), and from the Group 2 (10%; 95% CI 1.68–18.31%). Arterial hypertension was noted in 10.52% (95% CI 2.8–19.19%) of children from the Group 3 and 4% (95% CI -1.43–9.43%) from the Group 2. Also, in children from the Group 2, skin infections — 4% (95% CI 1.43–9.43%), obstructive sleep apnea syndrome 2% (95% CI 1.88–5.88%). Diabetes mellitus was recorded in 5.35% (95% CI -0.7–10.7%) of the interviewed children from the Group 3. There were no cases of diabetes mellitus in children from the Group 2. Endocrine pathology (polycystic ovary syndrome, hyperandrogenism) were ruled out in pubescent children from the Group 3, short stature, and low growth rate. Genetic testing was indicated for patients with extremely severe obesity, as well as with clinical evidence of genetic obesity syndromes and/or a family history of extreme obesity.

All children and adolescents from the Groups 2 and 3 were recommended family-oriented lifestyle modification, which contribute to the reduction of BMI (healthy diets, regular physical activity, changes in sedentary behavior). Control of therapy was carried out according to BMI, systolic blood pressure, the level of triglycerides and high-density lipoproteins in blood serum.

When studying the state of anxiety in adolescents using the Spielberger–Khanin scale, a high level of personal anxiety was noted in children from the Group 2 in 24.0%, and from the Group 3 in 73.2% of cases (Table 1). In the Group 1 children, a high degree of anxiety was found in 2.1%. Among adolescents from the Group 3, compared to controls, the indicator of a high level of personal anxiety differed statistically significantly and was equal to χ^2=49.9, p=0.0001.

Personal anxiety characterizes a persistent tendency to perceive a wide range of objectively safe situations as threatening, and to react to such situations with a state of anxiety. This is a stable individual characteristic of a person's degree of susceptibility to various stressors. Very high personal anxiety is directly correlated with the presence of neurotic conflict, emotional and neurotic disturbances and with psychosomatic diseases. Teenagers with a high level of personal anxiety are charac-

Table 1

The level of personal anxiety in children with obesity, overweight and control group

Level of personal anxiety	Obesity n=56		Overweight n=50		Control n=47	
	N	% (95% CI)	N	% (95% CI)	N	% (95% CI)
Low	1	1.78 (-1.66–5.66)	12	24.00 (12.16–35.83)	18	38.29 (24.12–51.87)
Moderate	14	25.01 (13.65–36.34)	26	52.00 (38.15–65.84)	28	59.58 (45.99–74.00)
High	41	73.21 (61.37–84.62)	12	24.00 (12.16–35.83)	1	2.13 (-2.00–6.00)
Average level of anxiety in the group	50.1±1.04*		36.98±0.99*		30.27±0.98	

Note: * — Statistical significance of differences with indicators of the control group p<0.05.

Table 2

The level of situational anxiety in children with obesity, overweight and the control group

Level of situational anxiety	Obesity n=56		Overweight n=50		Control n=47	
	N	% (95% CI)	N	% (95% CI)	N	% (95% CI)
Low	9	19.64 (9.52–30.47)	13	26.00 (13.84–38.15)	19	40.42 (25.99–54.00)
Moderate	36	64.28 (51.42–76.57)	31	62.00 (48.54–75.45)	26	55.32 (40.77–69.22)
High	11	16.08 (6.4–25.6)	6	12.00 (2.99–21.00)	2	4.26 (-1.6–9.6)
Average level of anxiety in the group	38.94±0.74*		34.62±0.9		33.91±0.93	

Note: * — Statistical significance of differences with indicators of the control group p<0.05.

terized by depressed mood, low level of self-control, emotional tension, stubbornness and aggressiveness, which creates problems in communicating with others. Emotional tension is a chronic stress factor that contributes to the development of food addiction [8].

When assessing situational anxiety, a high level was noted in adolescents from the Group 2 in 12.0%, from the Group 3 in 16.1% of cases, compared to adolescents with normal body weight, in which high the level of anxiety was found in 4.3% (Table 2). Among adolescents from the Group 3, compared to control, the indicator of a high level of situational anxiety also differed statistically significantly and was equal to χ^2=5.49, p=0.019.

Situational anxiety (reactive anxiety) is characterized by subjectively experienced emotions: dynamic tension, anxiety, preoccupation, and nervousness. This state occurs as an emotional reaction to a stressful situation (situational inability of a person to cope with the requirements of a specific task and/or expectations of a partner, fear of negative evaluation or aggressive reaction, perception of an unfavorable attitude towards oneself) and differs in intensity [10]. The measure of situational anxiety is a kind of one-moment «slice» of an individual's emotional state, its level changes over time depending on how much a person perceives their environment as dangerous or threatening. Very high reactive anxiety causes impaired attention, and sometimes impaired fine coordination.

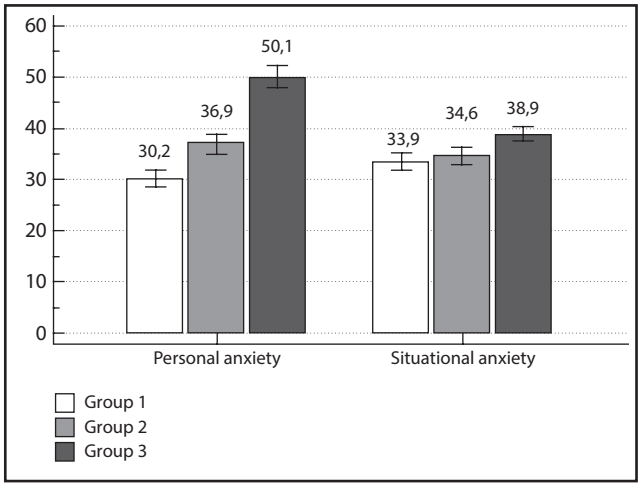

Fig. The result of one-way ANOVA in the graphic display of anxiety indicators in the studied groups of children

Thus, anxiety as an emotional discomfort associated with the expectation and anticipation of unpleasant experiences or danger is characteristic of a significant part of children with excess body weight and obesity. The importance of assessing the level of anxiety is related to the fact that it can be considered an indicator of a «pre-neurotic state» and an indicator of behavioral disorders, such as antisocial and addictive behavior. Anxiety also affects the success of schoolchildren's educational activities: it is more difficult for anxious children to achieve their goals, to demonstrate their knowledge and skills. Severe anxiety significantly affects daily life, the type and nature of nutrition, determining changes in body weight [1].

Usually, indicators of personal and situational anxiety are related to each other: in children with high indicators of personal anxiety, situational anxiety in similar situations increases and manifests itself to a greater extent. Our data confirm this connection (Fig.).

A moderate degree of personal anxiety was found in adolescents with normal body weight (the Group 1) in 59.58% (n=28), with excess body weight (the Group 2) in 52% (n=26) of patients, and in 25.01% (n=14) in the group with obesity (the Group 3). A low level of anxiety was noted in adolescents from the Group 1 in 38.29% (n=18), from the Group 2 in 24% (n=12) of cases, while in adolescents from the Group 3, a low level of personal anxiety occurred only in 1 (1.78%) child. The coefficient of variation of variance analysis when comparing groups of personal anxiety was equal to F=112.03, p<0.0001 (Table 1, Fig.).

A moderate degree of situational anxiety was found in 55.32% (n=26) of adolescents from the

Group 1, from the Group 3 in 64.28% (n=36), and in the group of adolescents from the Group 2 in 62% (n=31) cases. A low level of situational anxiety was diagnosed in adolescents from the Group 3 in 19.64% (n=9), in adolescents from the Group 1 in 40.42% (n=19), and from the Group 2 in 26% (n=13) cases. The coefficient of variability of the variance analysis when comparing groups of situational anxiety was equal to F=13.57, p<0.001 (Table 2, Fig. 1).

High anxiety prevents patients from abandoning an unhealthy lifestyle and eating habits, which significantly hinders success in reducing body weight. The obtained results correspond to international data on changes in the psycho-emotional state of children with chronic diseases [2,12].

The prospects for further research are the development of an algorithm for improving the quality of life of children with overweight and obesity on the basis of an assessment of the psycho-emotional state, psychological support, correction of psycho-emotional disorders and the formation of a healthy lifestyle.

Conclusions

In children and adolescents with overweight and obesity, changes in the psycho-emotional state have been established. The level of anxiety increased in proportion to the degree of increase in body weight. Personal anxiety in children with obesity compared to control was noted at a higher level — 50.1±1.04 and 30.27±0.98, respectively. Indicator χ^2=49.9, p=0.0001. Situational anxiety also increased in children with obesity, but the differences were expressed to a lesser extent — 38.94±0.74 and 33.91±0.93. Indicator χ^2=5.49, p=0.019.

In order to prevent the possible debut of a psychosomatic disease and reduce emo-tional distress, as well as improve the quality of life, it is necessary to carry out active preventive measures aimed at stabilizing body weight and correcting psychogenic disorders in the group of teenagers with excessive body weight and obesity.

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