INTERPLAY OF THE INDICATORS OF PHYSICAL DEVELOPMENT AND PSYCHOLOGICAL STATUS IN THE YOUNG ADULT MEDICAL STUDENTS

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Currently, there is increasing number of overweight people all over the world. The increase in the incidence of depression among the population, especially among adolescents and young adults, has been reported. The study was aimed to determine the relationship between excess body weight and severity of depression in the young adult students taught at the initial courses in the medical university. The study involved 230 junior medical students (163 females and 67 males) having no chronic disorders. Body mass index (BMI) was determined in the subjects. The depression severity was defined using the Beck Depression Inventory. The analysis showed that the average BMI was 3.0 ± 3.9 AU in males and 22.0 ± 4.3 AU in females. The share of underweight male subjects was 7.5%, while the share of underweight females was 10.5%; 28.3% of males and 13.5% of female subjects had excess body weight and obesity of varying severity. No signs of depression were found in 66.0% of males and 61.0% of females. We revealed no significant correlation between BMI and depression.

Keywords: students, body mass index, depression, mental health, Beck Depression Inventory

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Compliance with ethical standards: the study was approved by the local Ethics Committee of the Pirogov Russian National Research Medical University (protocol № 213 dated 13 December 2021) and conducted in accordance with the Declaration of Helsinki of the World Medical Association. The written informed consent was obtained from all subjects.

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ВЗАИМОСВЯЗЬ ПОКАЗАТЕЛЕЙ ФИЗИЧЕСКОГО РАЗВИТИЯ И ПСИХОЛОГИЧЕСКОГО СОСТОЯНИЯ СТУДЕНТОВ-МЕДИКОВ ЮНОШЕСКОГО ВОЗРАСТА

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Сейчас в мире растет число людей с избыточной массой тела. Установлено увеличение частоты депрессивных состояний среди населения, в особенности у подростков и людей юношеского возраста. Целью исследования было определить взаимосвязь избыточной массы тела и степени депрессии у студентов юношеского возраста, обучающихся на начальных курсах медицинского вуза. В исследовании приняли участие 230 студентов-медиков начальных курсов (163 девушки и 67 юношей) без хронических заболеваний. У обследуемых определяли индекс массы тела (ИМТ). Степень депрессии определяли с помощью шкалы депрессии Бека. В результате анализа установлено, что средние показатели ИМТ у юношей равны 23,0 ± 3,9 у. е., а у девушек — 22,0 ± 4,3 у. е. Количество обследованных юношей с дефицитом массы тела составило 7,5%, а количество девушек — 10,5%; 28,3% обследованных юношей и 13,5% девушек имели избыточную массу и ожирение разной степени. У 66,0% юношей и 61,0% девушек отсутствовали признаки депрессии. Статистически значимой связи между ИМТ и депрессией обнаружено не было.

Ключевые слова: студенты, индекс массы тела, депрессия, психическое здоровье, шкала депрессии Бека

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Medical universities are more and more often recognized as the institutions contributing to improving health and well-being, maximization of academic performance, career achievements and positive attitude towards health [1].

At the same time, there are concerns about the university students' mental health, as well as about other factors affecting academic success, such as the degree of overweight.

Obesity is one of the main risk factors of metabolic syndrome causing cardiovascular, endocrine, and other disorders. According to numerous studies, obese children often have persistent obesity later in life [2].

While childhood obesity and the related metabolic syndrome are recognized as pressing issues all over the world, there is still a shortage of weight loss programs. It is estimated that in 2020 a total of 38.2 million children under the age of 5 years were overweight or had obesity [3, 4].

It has been shown that multidisciplinary approaches to weight loss involving a nutritionist, expert in physical exercise, and psychologist that are focused on changing the lifestyle, are the most effective [5–7].

Calculation of body mass index (BMI) is one of the rather simple and affordable methods to determine body weight. The method is suitable for estimation of optimal body weight that can be managed and maintained for a long time [8].

Many researchers believe that the individual's psychological status affects body weight both upward and downward [9].

Currently, the pandemic of novel coronavirus infection (COVID-19) is also considered to be associated with both poor mental health and overweight, especially in obese individuals [10, 11].

Stress tolerance represents one of the mental health factors [12]. Stimulation of the stress-related metabolic and neurobiological alterations coordinates the brain responses in order to provide behavioral adaptation. The long-term stress exposure can result in adverse physiological and behavioral changes, such as depression, metabolic syndrome, etc. [13].

In young adulthood (18–21 years), when the final growth and stabilization of the major body parameters take place, the degree of the individual's physical and mental health is determined in order to predict further personality and performance [14].

Medical students, both in the Russian Federation and abroad, go through a lot of sress during training. Malnutrition, harmful habits, low physical activity, and inadequate daily routine increase the risk of obesity and, consequently, metabolic syndrome; these also lead to persistent depression. The long-term stress exposure can be detrimental to the effectiveness of the training material perception and analysis, which leads to the decrease in academic performance and possible expulsion from the university [15–17].

There are also differences in manifestations of depression between males and females. Women usually complain of the feelings of anxiety, hopelessness, emptiness, helplessness, as well as of tearfulness, body weight changes, and pain in different parts of the body. Thus, the features of depression in women represent the more severe disorders of the anxiety and depression spectrum, somatization and more prominent verbalization of complaints and experiences. In males, apathy and being emotionally distant, motor retardation and changes in behavioral responses predominate in the course of depression. Furthermore, males are more often prone to harmful habits and risky behavior. There is an opinion that the gender-related differences associated with depression manifest themselves not in the sybjective experience of depression, but in the behavioral expression of this experience [18].

It is necessary to take a holistic approach to the health of young people, not only by creating favorable social and hygienic environment, but also by contributing to shaping a healthy lifestyle, especially in future doctors. In this regard, assessment of students aimed to reveal excess body weight and obesity using BMI can help adequate adjustment of body weight to normal. Furthermore, it is necessary to control the depression severity in today's young adults. Depression represents one of the leading mental disorders all over the world [19]. According to the WHO, in 2017 depression was found in about 34 million people; the experts predict further growth of this indicator [20].

The Depression Inventory by A. Beck represents one of the screening methods for depression allowing one to quickly determine the depression severity at the pre-medical stage and refer the individual to psychologist, if necessary [21].

The study was aimed to determine the relationship between excess body weight and severity of depression in the young adult students taught at the initial courses in the medical university.

METHODS

We assessed 230 first-year and second-year students of the Pirogov Russian National Research Medical University (163 females and 67 males aged 18–21 years with no history of chronic disorders), in whom we determined anthropometric indices (body length and weight) needed to calculate BMI (BMI = body weight (kg)/body length (m^2)) at the laboratory of integrative anthropology and hygienic assessment of the Department of Human Anatomy. Body length was measured using the GMP anthropometer (Switzerland) with the accuracy of up to 0.1 mm. Body weight was measured using the VMEN-150/200 medical digital floor scales (TVES; Russia) with the accuracy of ± 50 g.

The depression severity was determined using the Depression Inventory by A. Beck in the morning, outside stressful periods (surveys, modules, exams). The Inventory consists of 21 statements structured based on the types of psychopathological symptoms. Items 1–13 represent a cognitive/affective subscale (assessment of the individual's emotional state, him/herself, his/her beliefs and problems), while items 14–21 represent a somatization subscale (complaints of symptoms not verified clinically). When assessing the results, the total score below 9 suggests no symptoms of depression. The total score of 10–18 corresponds to mild depression considered as "episodes" in patients with somatic disorders or individuals with high levels of neuroticism, the score of 19–29 corresponds to moderate depression representing a critical level, the score of 30–63 corresponds to severe depression, when endogeneity cannot be excluded [22].

Statistical processing of the results was performed using the StatTech 3.0.7 software package (StatTech; Russia). The standard indices were calculated, along with the Spearman's correlation coefficient (*r*).

RESULTS

The analysis of BMI values in the entire group of students (Table 1) showed that the average BMI was 22.3 ± 4.2 AU, which was within the normal range. Furthermore, in the group of males BMI was 23.0 ± 3.9 AU, while in the group of females it was 22.0 ± 4.3 AU. The total number of students with healthy body weight (18.5–24.9 AU) was 167 (72.6%): 43 males (64.2%), 124 females (76.0%). The number of underweight students (< 18.5 AU) was 22 (9.6%): five males (7.5%) had minimal BMI values of about 15.2 AU, and 17 females (10.5%) had BMI of about 16.2 AU. The number of overweight students (25.0–29.99 AU) in the entire group was 29 (12.6%): 16 males (23.8%), 13 females (8.0%). Class 1 obesity (30.0–34.9 AU) was revealed in eight individuals (3.5%): two males (3.0%) and six females (3.7%). Class 2 obesity (35.0–39.9 AU) was revealed in only one girl (0.6%). Class 3 obesity (> 40.0 AU) was found in three individuals (1.3%): one male (1.5%) and two females (1.2%).

Table 2 shows that among males there were 19 individuals with excess body weight and obesity (28.3%), while among females there were 22 overweight or obese individuals (13.5%).

Assessment of the Beck Depression Inventory scores showed that the average score for the entire cohort of students was 9.2 ± 7.4 points; it was 8.3 ± 6.7 points in the group of males and 9.5 ± 7.7 points in the group of females. No symptoms of depression were revealed in 143 students (62.2%). In the group of young males no depression was found in 44 individuals (65.7%), while in the group of females there were 99 individuals (60.7%) with no depression.

Among 43 young males with healthy body weight, 16 had signs of depression (12 individuals with mild depression, four individuals with moderate depression). Among underweight males, there were two individuals with mild depression, while among overweight males there were one individual with mild and two individuals with moderate depression. One individual

Table 1. BMI (AU) in males and females

Students	Number of students	M ± σ
Males	67	23.0 ± 3.9
Females	163	22.0 ± 4.3
Total	230	22.3 ± 4.2

Table 2. Number of students with different BMI vaues

BMI criteria	Males (n = 67)	Females (n = 163)	Total (n = 230)
Underweight	5 (7.5%)	17 (10.5%)	22 (9.6%)
Healthy weight	43 (64.2%)	124 (76%)	167 (72.6%)
Overweight	16 (23.8%)	13 (8.0%).	29 (12.6%)
Class 1 obesity	2 (3.0%)	6 (3.7%)	8 (3.5%)
Class 2 obesity	–	1 (0.6%)	1 (0.4%)
Class 3 obesity	1 (1.5%)	2 (1.2%)	3 (1.3%)

with severe depression was found among students with class 1 obesity. Among students with class 3 obesity, only one individual had mild depression (Table 3). A total of 48 individuals with depression were identified in the group of young females with healthy weight: 34 individuals with mild, 10 with moderate and four with severe depression. Among underweight female students, five individuals had mild depression and one had moderate depression. In the group of overweight young females (13 individuals), four individuals had mild and two had moderate depression. Among six individuals with class 1 obesity, mild depression was found in two. Mild depression was determined in one female student with class 2 obesity; two individuals with class 3 obesity had mild-to-moderate depression (Table 4).

The correlation analysis revealed a negative correlation between BMI and Beck Depression Inventory scores in males: the correlation strength based on the Chaddock's scale was considered to be weak, and the relationship of traits was non-significant (p = 0.08). The determination coefficient (r^2 = 0.04) suggests that there is no correlation between the variables. In females, there is a positive weak (based on the Chaddock's scale) correlation between the studied traits; the relationship between the traits is non-significant (p = 0.07), and the determination coefficient (r^2 = 0.02) shows that the variables are not related.

DISCUSSION

According to some studies, obesity ensured protection agaist depression in males and at the same time was a predictor of depression in young females [23].

A number of researchers found that the risk of depression increased many-fold in males with BMI > 40, while in young females the risk was associated with even small body weight fluctuations [24].

A total of 1584 undergraduate students of the Nigerian University of Agriculture (mean age 21.8 ± 2.2 years) were examined in order to assess the correlation between anxiety (Beck Anxiety Inventory) and BMI. It was found that the prevalence of high anxiety (p > 0.05) was the same for both sexes, regardless of BMI. Furthermore, all obese males had low anxiety. No significant correlation (p > 0.05) between the Beck Anxiety Inventory scores and the degree of obesity was revealed in both males and females [25].

The other group of researchers tested 50 patients aged 18–50 years with multiple sclerosis having excess weight or obesity (BMI ≥ 25 kg/m^2) for the symptoms of depression (Beck Depression Inventory) and anxiety. No relationship between depression, BMI, waist circumference (WC) and the waist–hip ratio (WHR) was revealed. There was no correlation between the symptoms of anxiety, BMI, WC, and WHR. In contrast, assessment of body composition by dual-energy X-ray absorptiometry aimed to determine the total lean mass and the fat percentage revealed a significant correlation between the percentage of total fat and the depression and anxiety. Furthermore, there was a strong negative correlation between the lean mass and the depression and anxiety [26].

Assessment of the cohort of students (12,677 people) of Brazilian colleges and universities of different grades showed that the likelyhood of depression was significantly higher in females and junior students compared to males and senior students [27].

Thus, it is necessary to further assess the relationship between the indicators of physical development and psychological status of the individual.

CONSLUSIONS

The average BMI of all subjects is 22.3 ± 4.2 AU, which is within normal range. The share of underweight young males is 7.5%, while that of underweight females is 10.5%. The share of subjects with excess body weight and obesity of varying severity is 28.3% among males and 13.5% among

Table 3. Number of males with different BMI (AU) and severity of depression according to the Beck Depression Inventory (points)

Body mass index	Number of students	No depression (< 9)	Mild depression (10–18)	Moderate depression (19–29)	Severe depression (30–63)
Normal body weight	43	27 (63.0%)	12 (28.0%)	4 (9.0%)	–
Underweight	5	3 (60.0%)	2 (40.0%)	–	–
Overweight	16	13 (81.3%)	1 (6.2%)	2 (12.5%)	–
Class 1 obesity	2	1 (50.0%)	–	–	1 (50.0%)
Class 3 obesity	1	–	1 (100%)	–	–
Total	67	44 (66.0%)	16 (24.0%)	6 (9.0%)	1 (1.0%)

Table 4. Number of females with different BMI (AU) and severity of depression according to the Beck Depression Inventory (points)

Body mass index	Number of students	No depression (< 9)	Mild depression (10–18)	Moderate depression (19–29)	Severe depression (30–63)
Normal body weight	124	76 (61.4%)	34 (27.4%)	10 (8.0%)	4 (3.2%)
Underweight	17	11 (65.0%)	5 (29.0%)	1 (6.0%)	–
Overweight	13	8 (61.0%)	4 (31.0%)	1 (8.0%)	–
Class 1 obesity	6	4 (67.0%)	2 (33.0%)	–	–
Class 2 obesity	1	–	1 (100%)	–	–
Class 3 obesity	2	–	1 (50.0%)	1 (50.0%)	–
Total	163	99 (61.0%)	47 (29.0%)	13 (8.0%)	4 (2.0%)

females. There are no signs of depression in 66.0% of males and 61.0% of females. Assessment of the relationship between BMI and the Beck Depression Inventory scores has revealed multidirectional correlations between traits: a negative correlation has been found in males and a positive one has been found in females. Furthermore, the relationships are weak based on the Chaddock's scale; the correlations between traits are non-significant for both sexes.

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