

# Reasons and features of occurrence of excess body weight at students taking into account gender differences

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**Purpose:** the definition of reasons and features of occurrence of excess body weight at students taking into account the gender differences, which are connected with irrational lifestyle, violation of food behavior, insufficient physical activity.

**Material & Methods:** students of 1–4 courses of Odessa national medical university, 26 girls and 22 boys, with the excess body weight and obesity aged from 18 to 24 years for the research were selected.

**Results:** reliable differences in adipopexis type, percent of visceral and subcutaneous fat, and also indexes “waist-hip” at the respondents, connected with the article, are found.

**Conclusions:** modification of lifestyle, wrong food behavior, selection of physical activity, has to be carried out taking into account the type of adipopexis and sex of students.

**Keywords:** obesity, students, gender differences, lifestyle.

## Introduction

Now, according to data of WHO, more than 1,5 billion people have excess weight and more than 500 million have obesity [1; 2]. One of vulnerable categories for emergence of excess body weight is the student's youth. It is connected with the fact that the lifestyle of students is sated with factors, which can have potentially negative effect on health, provoking emergence of excess body weight. Among them – irrational ratio of work-rest schedule; decrease in physical activity; the considerable academic and emotional loads, which are connected with examination stress factors; chronic sleep debt; insufficient and irregular food, hobby for fast food and high-carbohydrate food [3; 4; 5].

It was defined in our researches of the structure of pathology, which is revealed during annual medical examinations at students of the I course that the most widespread is pathology of therapeutic profile among which the gastrointestinal diseases, which are followed by the excess body weight and obesity, rather often meet [6; 7]

The analysis of success of performance of test tasks which is carried out by us on physical education by students has shown that high is percent of student's youth, which do not carry out standards [6; 9]. It means that the level of physical fitness – low [6–8; 10].

According to literature, there are distinctions between types of adipopexis at men and women, features and causes of visceral obesity, influence of these factors on the state of health [9].

## Communication of the research with scientific programs, plans, subjects

The work is fragment of the research work of the chair of physical rehabilitation, sports medicine, physical education

and valueology of Odessa national medical university “The research of features of adaptation reactions of human body to exercise stresses depending on the level of physical development, functional state and state of health, for development of optimum programs of correction by methods of physical rehabilitation and functional food” (No. of state registration is 0113U006426, terms of performance of 2014–2018).

## The purpose of the research

To study reasons and features of emergence of excess body weight at students taking into account gender distinctions which are connected with irrational lifestyle, violation of food behavior, insufficient physical activity.

## Material and Methods of the research

Students of 1–4 courses of medical university, 26 girls and 22 boys with excess body weight and obesity from 18 to 24 years old to which conducted the research of anthropometrical parameters on standard techniques (the measurement of height, weight, circles of waist and hips) were selected for research.

Body weight index (BWI) is also calculated by the formula: BWI = body weight, kg / length of body, ml. BWI 18,9–24,9 indicators  $\text{kg}\cdot\text{m}^{-2}$  are considered as normal body weight. All surveyed with various degree of excess body weight ( $\text{BWI}>25$ ) were divided into two groups: I group (pre-obesity, excess

**Table 1**  
The characteristic of the studied contingent

I group (pre-obesity) BWI 25–30 (n=30)		II group (obesity) BWI>30 (n=18)	
Girls, n=17	Boys, n=13	Girls, n=9	Boys, n=9

body weight) – with BWI 25–30 (30 people), II group with BWI>30 with various degrees of obesity (18 people) (tab. 1).

The type of adipopexis was estimated on the index of “waist-hip” (IWH) – the indicator characterizing distribution of fatty deposits in body of the person. According to the protocol of WHO, the circle of waist was measured in the middle between bottom edge of the lower edge and top of iliac crest by means of centimetric tape. The circle of hips was measured around the widest part of buttocks, by the same tape, which is located in parallel to the floor. The calculation of indicator was carried out on the formula:  $IWH = \text{circle of waist (cm)} / \text{hips (cm)}$ , index indicators for girls less than 0,85, and for boys less than 0,9 were considered normal.

The measurement of hypodermic and fatty folds was performed by means of electronic caliper-butylrometer Digital Body Fat Caliper which is intended for the determination of thickness of fatty fold for the purpose of assessment of adipopexis and uniformity of its distribution on body of the person. Measurements were taken in four different places: triceps: in the middle between shoulder and elbow joint from back side of hand; biceps: in the middle between shoulder and elbow joint from forward side of hand; shovel: the fold undertook slightly below than shovel at an angle of 45 degrees; on the right side of body on stomach near navel where the vertical fold at distance of 2 cm undertook from it. Holding caliper in the right hand, took skin and fatty fold big and index fingers of the left hand between the distance depending on which thickness of fold has to make from 4 to 8 cm, and soft, without causing painful feeling at surveyed, raised fold on height about 1 cm. The assessment was carried out, summarizing all four indicators according to recommendations of R. Schmidt and G. Tevs (2005).

In spite of the fact that caliperometry and definition of indexes of body weight and “waist-hip” are widely used methods for studying of structure of body, they remain insufficient for determination of various parameters of ratio of components of body which exert the considerable impact on result of the research.

The definition of composite structure of body of the person was carried out by means of the device OMRON BF-508 on the basis of the bio-impedance analysis of components of structure of body on 8-touch technology at which palms and feet are involved. Very small electric current absolutely harmless to the person and not felt during the procedure was passed during the measurement through organism. As a result of measurements data on percentage ratio of fatty and muscular component in body, percent of visceral fat, and also data on the main exchange of the studied students were obtained.

The questioning of student’s youth (fig. 1) was carried out for the purpose of the determination of commitment of students to healthy lifestyle (HL) and identifications of violations of food behavior. The questionnaire included questions concerning the number of meals, existence of night consumption of food, fast food in diet of the investigated and also physical activity, observance of sleep pattern and wakefulness. 11–13 points, – 10–7 points were considered to healthy lifestyle as average commitment as high commitment, less than 7 points were estimated as low commitment to healthy lifestyle.

QUESTIONNAIRE OF DETERMINATION OF COMMITMENT OF STUDENTS TO HEALTHY LIFESTYLE		
<b>1. How many times do you eat during the day?</b> 1–2 – 0 points                      3–4 – 1 points		
<b>2. Do night meals have to be?</b> Yes – 0 points                      No – 1 point		
<b>3. Do you eat fast food?</b> Yes – 0 points                      No – 1 point		
<b>4. Do you often gorge on to feeling of discomfort from overflow of stomach?</b> Yes – 0 points                      No – 1 point		
<b>5. Do you engage in physical culture and sport?</b> No – 0 points                      once a week – 1 point                      2–3 times a week – 2 points		
<b>6. Do you take alcohol?</b> Regularly – 0 points                      Seldom – 1 point                      No – 2 points		
<b>7. Do you smoke?</b> Yes – 0 points                      No – 1 point		
<b>8. How long does your dream last at night?</b> <5 hours – 0 points                      5 – 1 point                      7–8 – 2 points		
<b>9. The average time when you go to bed:</b> After 00.00 – 0 points                      23.00–24.00 – 1 point                      Before 23.00 – 2 points		
<b>Total scoring:</b> High commitment to healthy lifestyle of 11–13 points Average commitment to healthy lifestyle of 10–7 points Low commitment to healthy lifestyle less than 7 points		

Fig. 1. QUESTIONNAIRE

## Results of the research and their discussion

Studying of conditions and lifestyle of the examined students with excess body weight confirms tendency, characteristic of the last decade, to the growth of prevalence of addictions among students, violation of diet and night dream, low level of physical activity.

The analysis of biographical particulars of character of eating habits has shown the prevalence of the rare irregular use of food, wrong distribution of daily diet (1–2 times mainly in the evening). Night consumption of food noted 30% of the examined of the 1 group, half of the surveyed from the 2 groups. Frequent taking of fast food is specified by all examined students with excess body weight. Addictions (smoking and consumption of alcohol) met in the identical number of questionnaires at third of the surveyed both the first, and the second

Table 2  
Interrelation of the index “waist-hip”, index of body weight and % of visceral fat

BWI	I group (pre-obesity) BWI 25–30 (n=30)		II group (obesity) BWI>30 (n=18)	
	Girls, n=17	Boys, n=13	Girls, n=9	Boys, n=9
The investigated contingent				
Index “waist-hip”	0,96±0,02	1,01±0,03	1,01±0,02	1,4±0,01
% visceral fat	6,2±0,01*	11,8±1,17*	8,7**±0,02	15,2**±1,17

Note. \*, \*\* – distinctions are reliable.

groups. However violation of night dream, late withdrawal for sleeping, night meals met with various degrees of obesity more often in the group of persons. Any of the surveyed of the second group did not play regularly physical culture and sport. 6 girls and 3 boys have celebrated classes in groups of physical education among persons with pre-obesity.

The fact of increase in the index "waist-hip" in each of the groups of the examined has attracted attention in the analysis of anthropometrical indicators; however essential differences were noted taking into account gender features. So, in the group of examinees with pre-obesity of IWH made  $0,96 \pm 0,02$  for girls and  $1,01 \pm 0,03$  for boys at norm of indicators of index for girls less than 0,85, and for boys less than 0,9. This index considerably exceeded norm indicators in the second group with various degrees of obesity, namely  $1,01 \pm 0,02$  for girls and  $1,4 \pm 0,01$  for boys. This dynamics and prevalence of indicator in the group of men confirm the development in this contingent of excess amount of visceral fat that is separate predicted adverse risk factor of the development of diseases.

This fact was confirmed by results of bio-impedance research of composite structure of body. In the group of boys with obesity, indicators of visceral fat made  $15,2 \pm 1,17\%$  at norm from 1 to 9%, similar indicators in group of boys with pre-obesity were lower than  $11,8 \pm 1,17\%$ , however, did not keep within norm range too. Concerning the examined girls, it should be noted the normal amount of visceral fat which is not going beyond optimum values (1–9%) (tab. 2).

The results were received, demonstrating interrelation of degree of expressiveness of hypodermic fatty tissue, sex of the surveyed and the size of BWI (tab. 3), by comparison of the data on extent of development of hypodermic fatty tissue, which were obtained by the method of measurement of hypodermic and fatty folds by means of electronic caliper-butynameter Digital Body Fat Caliper, and the method of bio-impedometry. The extent of development of subcutaneous fat on result of summation of size of expressiveness of folds on body at equal BWI was higher at girls, the obtained data correlated with results of the bio-impedance analysis. Thus, the obtained data allow drawing the following conclusions.

## Conclusions

1. Health of students is caused by a number of factors and de-

pends on lifestyle in no small measure. It is possible to carry to the most frequent reasons of excess body weight: violation of food behavior (rare and late meals, prevalence in diet of high-carbohydrate products, existence of food allowance in fast-food) at 83,3% of the investigated of both sexes.

2. Regular physical activity and classes on physical culture and sport noted only 18,75% of the studied students, however all students who are going in for physical culture treated 1 the group (pre-obesity).

3. Indicators of IWH, which can be considered as the indirect indicator displaying degree of visceral obesity exceeded norm both at men, and at women. At the same time, there were essential gender differences of IWH correlating with expressiveness superfluous body weight namely, at BWI 25–30 students were characterized by uniform distribution of hypodermic fatty tissue that insignificantly influenced ratio «waist-hip». The sharp increase in circle of waist corresponding to excess of visceral fat was noted at BWI more than 30 at men.

4. The essential gender distinctions in number of visceral fat were revealed at assessment of composite structure of body by the bio-impedance method. These indicators have made  $13,7 \pm 1,1\%$  for men that considerably exceeds norm, and women were characterized by the moderate level of development of visceral fat  $6,8 \pm 0,2\%$  even at high rates of index of body weight. Gender differences on this indicator were expressed most significantly that allows to recommend it as the main criterion at assessment.

Surplus of hypodermic fatty tissue was also increased in proportion, depending on BWI, however had accurate gender distinctions that was shown in increase in total thickness of hypodermic collops at women to  $139,3 \pm 9,3$  mm, this indicator reached value of  $119,1 \pm 8,1$  mm at men that also testifies in favor of features of adipopexis at men and women with excess body weight.

6. Modification of lifestyle and the wrong food behavior with low physical activity has to be used for the benefit of strengthening and preservation of health of student's youth. And the most important and well-tried remedy of prevention of diseases is regular physical activity, at rational application taking into account BWI and sex of students, is able to promote the solution of topical issues of strengthening of health and high performance of student's youth that will serve as the perspective direction for our **further researches**.

**Table 3**

**Interrelation of extent of development of hypodermic fatty tissue, sex of the surveyed and sizes of BWI**

BWI	I group (pre-obesity) BWI 25-30 (n=30)		II group (obesity) BWI>30 (n=18)	
	Girls n=17	Boys n=13	Girls n=9	Boys n=9
The investigated contingent				
Total thickness of hypodermic collops, mm	$114,7 \pm 8,2^*$	$104,3 \pm 7,1$	$139,3 \pm 9,3^*$	$119,1 \pm 8,1$
% of subcutaneous fat	$40,2 \pm 3,1$	$31,7 \pm 2,8$	$47,2 \pm 2,2$	$34,7 \pm 2,6$

**Note.** \* – distinctions are reliable.

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