STUDY ON THE OCCURRENCE OF ABNORMAL BODY MASS INDEX (BMI) IN FEMALE STUDENTS

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Abstract

The female students are a special group with a very specific status. The body mass index (BMI) is used to determine the normal values of the weight and the degree of fattening in adults aged over 18. The aim of this research is to study the distribution of abnormal BMI in female students. The objects of the study are 1357 female students from Trakia University - Stara Zagora in 2004, 2005, 2007, 2008 and 2009. As a conclusion we can say that the abnormal body mass in female students is a serious problem for the solution of which concrete measures should be taken. We recommend that modules with purposeful complex activities should be included in the curricula of higher schools. The introduction of elective subjects in the secondary and higher school or making personal program for individual study would contribute to the elimination of the abnormal body mass problem.

Key words: body mass index, female students, obesity

Introduction

The female students are a special group with a very specific status, determined by its social place – on the border between the working people, who create material and spiritual values, and the social group of pupils. Bearing in mind their age and social status we assume that they are in the prime of their lives, having good physical fitness and esthetic principles. The body mass index (BMI) is used to determine the normal values of the weight and the degree of fattening in adults aged over 18 (World Health Organisation, 2000). According to the World Health Organization (WHO) 19 out of 27 countries have already registered an average BMI above the healthy level of 25 kg/m². If this increase is kept without measures being taken the prevailing obesity percentage will reach 20.1% in all 27 countries of EU in 2020 (Nysom, et al., 2001). On the basis of the data, collected from a study on the health status of the population in March 2001, the BMI for each person aged 18 and over was calculated.According to this index the share of overweight men decreases, but remains high-from 38,5 % (1996) to 32 % in 2001. In women the change is bigger- from 39,5 % to 30 % or almost 10 points, but the relative share still remains high. The overweight people aged between 45-64 are relatively the most – 41 %, and the least are those aged between 18-24 – 8 % (Langenberg, et all., 2003).

Aim

The aim of this research is to study the distribution of abnormal BMI in female students. The realization of the aim requires the solution to the following tasks:
2. Calculating the individual and average values of BMI.
3. Analyzing the results obtained.

Methods

The subject of the study is the abnormal BMI in female students from Trakia University - Stara Zagora. The objects of the study are 1357 female students from Trakia University- Stara Zagora in 2004, 2005, 2007, 2008 and 2009. Anthropometry, alternative and comparative analysis and interview have been applied. The height and the body mass have been measured according to a standard methodology. In order to evaluate the fattening of the persons studied the body mass index has been calculated on the basis of data about height and body mass. The following equation has been used (Malina, and Katzmarzyk, 1999):

\[
\text{BMI} = \frac{\text{Body mass (in kg)}}{\text{Height (m)}^2}
\]

The evaluation has been made according to the following scale:

<table>
<thead>
<tr>
<th>Category</th>
<th>BMI Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Underweight</td>
<td>&lt;18.50</td>
</tr>
<tr>
<td>Overweight</td>
<td>≥25.00</td>
</tr>
<tr>
<td>Pre-obese</td>
<td>25.00 - 29.99</td>
</tr>
<tr>
<td>Obese</td>
<td>≥30.00</td>
</tr>
<tr>
<td>Obese class I</td>
<td>30.00 - 34.99</td>
</tr>
<tr>
<td>Obese class II</td>
<td>35.00 - 39.99</td>
</tr>
<tr>
<td>Obese class III</td>
<td>≥40.00</td>
</tr>
</tbody>
</table>
Results and discussion

In the present study the abnormal body mass - underweight, overweight - pre-obese, and I, II, III class obesity have been emphasized. The results about the body mass under the normal (underweight) are showed in graphics on fig.1. The relative share during the four out of five years studied is too high (over 10%). In 2004 it was 11.03%, in 2007-10.84% and in 2008 it was 15.38 which is the highest relative share. In 2009 a high share of underweight female students was registered again -14.34%. In 2005 the relative share was the lowest - 6.44%. The problem about “body mass under the normal” is pushed in the background by the problem of the overweight which is more discussed. The former is not paid enough attention because of the social element which, in most cases, causes it. The underweight can be due to under-nutrition or malnutrition, to poor financial means or a desire for reduction of the body mass. The under-nutrition, the low intake of energy and proteins weaken the immune functions and deficiency diseases develop. Serious health problems may appear during a systematic starvation without permanent control. In the last decades an increase in the diseases, related to systematic under-nutrition or malnutrition during teenage, has been observed (Milewicz, et al., 2005, Yumuk, 2005). These are the so called nutrition disorders known as anorexia nervosa and bulimia nervosa, which are observed in young secondary school girls who practice under-nutrition on purpose. These are multifactor diseases difficult to be put under control (Vidović, 1998). In 2004, 2005 and 2007 the conversations with the underweight persons studied made clear that most of them did not want to change their body mass regardless of their emaciation. Only few of them prefer having a normal body mass. This fact shows they underestimate the danger of serious health problems. In 2008 and 2009 a sharp change in the students’ desire to change their body mass was established. They expressed their preferences for esthetical shaping of the body by “covering it” with muscle mass. In most of the cases the persons studied look for expert help to realize their purposes (Благосклонная, et al., 2003).

The category “overweight” takes up a particular place in the evaluation system of the body mass. It is a “red light” warning of the danger of obesity. Taking control over the overweight is a preventive healthy measure, a prerequisite for good health. In the present study the following relative shares of overweight (pre-obese) female students have been registered: for 2004- 14.96%, for 2005-12.6%, for 2007-13.86%, for 2008-8.97% and for 2009-11.46% (fig.2). The high values hide a real threat for the overweight (pre-obese) female students to go into the next category - obesity. During the conversations with the female students from this group they expressed their desire to shape an esthetic body and to correct their body mass. The persons studied share their disappointment with their unsuccessful experience to solve this problem by themselves. Very few overweight students do not show any interest in the problem.

The obesity represents an excessive accumulation of fatty tissue in the organism. Depending on the extent of this accumulation the state is classified as overweight or obesity indicating different degrees of health risk. Obesity is a very serious health problem for Bulgaria. It is one of the most widely occurring risk factors affecting nearly half of our population. The data in the persons studied shows occurrence of this risk factor among the female students too. The results in the present study show a higher relative share of the persons studied in 2005 - 7.19% compared to these in 2008- 5.13% and in 2009- 4.46%. In 2004 and 2007 the results are almost equal (respectively 3.15% and 3.01%) (figure 3).
When commenting data about obese young women even the presence of only one case is alarming. In the present study only in 2004 there were no registered female students with II class obesity. In 2005 they were 2.08%, in 2007 -1.81% in 2008 - 1.29%. The relative share of II class obesity in 2009 was high - higher than the relative shares of the previous two years considered together (3.18%) (figure 4).

![Figure 4. Relative share of the persons studied with "II class obesity"](image)

In 2005 and 2008 persons with III class obesity were not registered. In 2004 1.57% of the persons studied were with a high health risk 1.81% - in 2007 and 0.64% - in 2009. Logically follows the analysis of the summarized results about abnormal body mass including: body mass under the normal, body mass above the normal, I class obesity, II class obesity and III class obesity and about overweight including: body mass above normal, I class obesity, II class obesity and III class obesity. High increase in the relative share of the abnormal persons studied is observed. In 2004 it was almost the same as in 2008 - 30.71% and 30.77% respectively. It was lower in 2005 - 28.3%, and in 2007 it was 29.52%, the highest- 34.08% being in 2009 (figure 5). The average value of the relative shares for the persons studied from this group is very high - 30.68%. This means that 3 out of 4 of every 10 female students are included in this group.

![Figure 5. Relative share of the persons studied with abnormal BMI](image)

The results obtained during the last 3 years have shown a trend towards increase in the underweight female students. In the overweight comparatively stable values were mentioned in 2004, 2005 and 2007. There was a slight decrease in 2008 and another increase in 2009. The fact that the relative shares of underweight female students and of overweight ones in 2008 were almost the same, 15.38% and 15.39% respectively, is interesting (figure 7).

![Figure 6. Average values (in %) of BMI of female students for the period 2004-2009.](image)

Conclusions

As a conclusion we can say that the abnormal body mass in female students is a serious problem for the solution of which concrete measures should be taken. We recommend that modules with purposeful complex activities should be included in the curricula of higher schools. The introduction of elective subjects in the secondary and higher school or making personal program for individual study would contribute to the elimination of the abnormal body mass problem.
**ISTRAŽIVANJE POJAVE PRETJERANOG INDEKSA TJELESNE MASE (BMI) KOD STUDENTICA**

**Sažetak**

**Ključne riječi:** index tjelesne mase, studentice, gojaznost

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