The follow up and regulation of body mass is an activity which, to a great extent, is a precondition for good health. One of the most significant problems, especially in urban societies, is the problem connected with being overweight (Баев, 1997; Димитров, 2002; Маркова, 1998).

The Body Mass Index characterises the extent of obesity of adult individuals. In the World Health Organization (WHO), an international classification for Body Mass Index has been developed. Studies at the National Statistical Institute indicate that in Bulgaria, every second citizen at the ages between 15 and 80 has a Body Mass Index (BMI) over 25 kg/m². The problem connected with the overweight body mass is serious and it is subject of research for a great number of authors (Larson, 1994; Топузов, 2002; Благосклонная & all, 2003; Витков, 2003; Дякова & Божкова, 2011).

The Body Mass Index at Trakia University has been under survey since 2004 (Дякова, 2007; Дякова & Божкова, 2008; Дякова, 2009). The conducted study and its results reveal a necessity of constant control, not only of the Body Mass Index, but also of realisation of detailed control of the content of body mass in the youth.

The purpose of the investigation is to conduct a detailed control of the content of body mass in female students.

For accomplishment of this purpose, we have put forth the following tasks:
1. Taking measurements

METHODS
Detailed control of the content of body mass has been conducted on a sample of 1352 female students from Trakia University in the period of 2009-2011. The control group included fourth-year female respondents.

We took measurements in relation to the percentage of body fat content, BMI, internal fat, muscle mass, basic metabolism, physical rating, bone mass, body water content, and metabolic age. The Japanese professional medical device “TANITA” - BODY COMPOSITION ANALYZER BC - 420MA “TANITA” was used. A detailed control of body mass through bioelectrical impedance was carried out. This method of measurement consisted of stepping on four electrodes of the device.
platform, with low; and harmless current being put through the body. Thus, we recorded the resistance and the quantity of various types of tissues in the body, respectively. Additionally, we used the detailing methods Dil – D2O, Dil - NaBr and DXA. Thanks to this most contemporary complex method, the measurement of fat tissue in all remaining parameters was as easy as measuring blood pressure.

**ANALYSIS OF THE RESULTS**

In **Figure 1**, the level of fat in the respondents is shown in percentages. Slightly over the half (53%) is the number of respondents with normal levels, their fat tissue percentage being >21% and <33%. Approximately every second respondent among the studied ones has fat levels above the normal.

The percentage of respondents with low levels of fat is very high – 31.9%. The imitation of extremely slim models and the wish to be like them is often the case among young girls. The defined minimum quantity of fat tissue is of vital significance for the daily functions of the organism and this is to be taken into consideration. Some of these girls have low health culture and they do not consider the consequences of the maintenance of low levels of fat tissue, such as: problems with joints, uphold of organs, body temperature regulation, vitamin preservation connected with inability of the body to help itself at scarce nourishment, etc.

The respondents belonging to the risky group (with cardio-vascular diseases – hypertonia, diabetes, cancer, etc.) are with not low percentage – with increased level of fat tissue are 7.8% (these are the respondents with fat mass >33% and <39%), and with high level of fat tissue (>39%) are 7.3% of the respondents.

The obesity index is calculated as a ratio between the Body Mass (in kg) and the height (in square metres). In **Fig. 2**, the percentage of respondents in relation to the BMI is indicated. Regarding this index, 62.1% of the respondents have normal levels. Under the normal are 17.7%, over the normal – 12.9%, and with obesity – 7.3%. If one takes into consideration only the results connected with the BMI, the condition of the body mass cannot be assessed precisely. Making analysis through bio-electrical impedance gives us the possibility for a detailed control. Frequently, some individual could be defined as overweight, while with the detailed control, it is established that it is due to increased muscle mass.

**Fig. 3** shows the percentage of respondents in relation to internal fat. Internal fat refers to the fat in the abdominal cavity around the vital organs in the abdominal area, small pelvis, and perineum. In many cases, with becoming of age, the fat distribution changes and it is probable for the same to be directed to the abdominal area (especially after the menopause among women). The low levels of internal fat decreases the risk of cardio-vascular diseases, namely – high blood pressure, diabetes - type 2, etc. The healthy levels are from 1 to 12. In
this study, the over-the-normal percentage level of internal fat is 3%.

**Fig. 4** shows the percentage of respondents in relation to the level of muscle mass. The weight of this index covers the skeletal and smooth (cardiac and digestion) muscles and water containing in them. Data show that a high percentage of the respondents – 78.9% have normal muscle mass. 3.9% of them need regular and continuous training with physical exercises and sports – these are the respondents with low levels of muscle mass. 16.8% are with increased levels of muscle mass, whereas the percentage of high levels of muscle mass is 0.4%.

**Fig. 5** shows the percentage of respondents in relation to the basic/main metabolism. The quantity of energy necessary for the work of the vital body functions at rest (for breathing, cardiovascular and nervous systems, liver, kidneys and other organs) is defined as basic metabolism. Energy is used even during sleep. About 70% of the energy used during the day is for the internal basic metabolism. Apart from that, energy is used for every single activity. The more dynamic the activity, the more calories are burnt. Very often, the overweight individuals have basic metabolism under the normal, and vice versa, thin-figured individuals have basic metabolism over the normal. Almost two thirds (67.2%) of the respondents have normal basic metabolisms, 10.3% - under the normal, and 22.4% - above normal levels.

Physical rating is the assessment of the physique measured by the ratio between body fat and muscle mass in the organism. Data obtained from the study show the following characteristics of the physical rating:

VM (very muscular) is the value for individuals with low percentage of fat and high quantity of muscle mass. The percentage of respondents with VM value in this study is too low – 0.4%.

UE (insufficient exercises) is the value for individuals with a standard percentage of fat and small quantity of muscle mass. 3% of the respondents lack exercises.

TM (thin and muscular) is the value for individuals with fat percentage under the normal and normal quantity of muscle mass. Here, there is a notable presence of respondents with this physical rating – 29.7%.

Т (thin) is the value for individuals with fat percentage under the normal and small quantity of muscle mass. Our experience shows that female students with this physical rating are difficult to be influenced on, and some of them are with indices characteristic of anorexia. The percentage of respondents with (T) values in this study is 2.2%.

SM (standard muscular) is the value for 8.6% of the respondents with standard percentage of fat and high quantity of muscle mass.
SB (super-heavy) is the value for individuals with percentage of fat over the norm (obese) and high quantity of muscle mass (8.2%).

S (standard) is the value for individuals with standard percentage of fat and normal quantity of muscle mass. The highest percentage of the respondents shows values of this physical rating – 41.4%. However, this is less than half of the respondents.

O (obese) is the value for individuals with percentage of fat over the normal (obese) and normal quantity of muscle mass. Too high is the percentage of female students with physical rating of obese ones (6.9%).

Bone mass is the quantity of bones in the organism and dry substance, including the level of minerals (for example, calcium). For individuals with body mass under 50 kg, 1.95 kg is assumed as being the normal level of bone mass, individuals with body mass from 50 to 75 kg – 2.4 kg, and for individuals with body mass over 75 kg – 2.95 kg.

In Fig. 7, the percentage of respondents in relation to the bone mass is shown. Out of the respondents, 64.8% have a normal bone mass. The share of respondents with bone mass under the normal is very high (35.2%). The formation of sound and strong bones is a process which requires continuous period of training with physical exercises and balanced nourishment. The obtained results suggest that we should emphasise this process.

Optimal values of water in the body ensure functioning of metabolism without any problems. Cells regenerate better and “age” more slowly. Probability of unlocking of any disease (especially tumors) decreases sharply. Blood does not coagulate, which alleviates the vessels and heart, thus decreasing the risk of infarctions. All organs, even inter-vertebrae discs feel better at optimum hydrating.

Water in the body has specifically important significance for the organism. Fig. 8 shows the percentage of respondents in relation to water content in the organism. 82.5% of the respondents have normal water content in the organism. Among them, the total water in the body is from 45% to 60%. With this index, in terms of health, things are positive. 8.1% of the respondents have “high” levels of water in the body (with water in the organism over 60%). Observations show that these individuals usually have very low levels of fat tissue. Vice versa – 9.4% of the respondents have low levels of water content in the organism (less than 45% water in the organism). It has been established that most often these are the individuals who have fat mass over the normal.

“Metabolic age” is a notion found in the field of health protection and fitness. This characteristic defines the age, corresponding to this type of metabolism and takes into consideration the basic metabolism and all the main body indices. When the metabolic age is higher than the biological one, it means that measures are to be taken for improvement of metabolism. Systematic and active training with physical education and sports contribute to building up of sound muscle tissue and decreasing of the metabolic age. Scientists constantly investigate the metabolic age conception.

Fig. 9 shows the percentage of respondents in relation to their metabolic age. The obtained results show that 59.1% of the respondents are with metabolic age under the biological one, and 2.2% are with metabolic age equal to the biological one. A great part of the respondents is with metabolic age over the biological one –
38.7%. The inclusion of more active physical activities and changes in nourishment regimen could decrease their metabolic age.

CONCLUSION

- The share of respondents with low levels of fat is bigger.
- Only a very small part of the respondents have low levels of muscle mass.
- Less than half of the respondents have “standard” physical rating.
- The observed differences between the levels of fat mass and Body Mass Index (BMI) (as an extent of obesity) are clear evidence of the necessity of a detailed control of the content of body mass.

In conclusion, it can be summarized that the conducted monitoring gives valuable information about the content of body mass in fourth-grade female students and the detailed control is a basis for forthcoming changes of each of the studied indices.

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DETAILED CONTROL OF BODY MASS AMONG STUDENT FEMALES

UDK: 796.012.1-056.25-057.87(497.2)
(Original scientific work)

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Abstract:
The monitoring and regulation of body mass is an activity that plays a significant role in good health. The purpose of this work is to conduct detailed control of the body composition of female students of the fourth year. Detailed control was carried out on a sample of 1352 female students from Trakia University in the period 2009-2011. In the control group, students of the fourth year were involved. The Japanese professional medical apparatus, "TANITA"-BODY COMPOSITION ANALYZER BC-420MA "TANITA" was used. It can be concluded that the conducted monitoring provides valuable information in terms of body composition and the control samples. Detailed control plays the role of the basis for upcoming changes in every measured indicator.

Key words: body mass, detailed, control, health, indicators

ДЕТАЛНА КОНТРОЛА НА ТЕЛЕСНАТА МАСА КАЈ СТУДЕНТКИТЕ

УДК: 796.012.1-056.25-057.87(497.2)
(Оригинален научен труд)

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Айсйраки:
Проследување и регулирање на телесната маса е активност која во голема мера опредељува условите за добро здравје. Целта на ова истражување е да се преведе детална контрола на соодветната телесна маса кај студентки од четврти година. Деталната контрола е преведена врз примерок од 1352 студентки од Универзитетскиот Тракия во периодот од 2009 до 2011. Во контролната група се вклучени студентки од четврти година. Јапонскиот професионален медицински апарат „ТАНИТА“ - BODY COMPOSITION ANALYZER BC - 420MA „ТАНИТА“. Може да се заклучи дека преведената мониторинг дава вредна информация во врска со содржината на телесната маса кај студентки од четврти година и дека деталната контрола преведува основа за предвидување и промени на секоја од промените и покажувани.

Ключни зборови: телесна маса, детална, контрола, здравје, покажувани