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KOMPARATIVNA ANALIZA DNEVNE ENERGETSKE POTROŠNJE STUDENTICE SA RAZLIČITIM INDEKSOM TJELESNE MASE

1. INTRODUCTION

Maintaining the balance between energy import and energy consumption becomes more difficult regarding the time that we live in. The physical activity is reduced. Science and technology are mechanized, many processes are automated, and as a result, the degree of muscle activity in humans is reduced. Physical work is frequently replaced with nerve-sensing and intellectual loadings. Restrictions of motor activities, and some other changes in the way of living, are assessed as ones of the most common environmental factors [5].

For acquisition and maintenance of body mass at norm is required to perform various motor activities [1,3,4].

Activities with physical exercises have many beneficial effects on the exchange of materials and increase energy consumption. Physical activity does not mean only training various sports activities (sports). The meaning is on all kinds of physical activities: walking, household duties, gardening, dancing etc... [9,10].

The aim of this research is to determine and compare the whole day energy consumption of female students with body mass index "Having a normal" and "Before obesity".

Implemented were the following tasks:

1. To determine the individual values of BMI and determine the persons for the research with BMI "Having a normal" and "Before obesity".
2. To measure and compare the whole day energy consumption of female students with "Having a normal" BMI and "Before obesity".
3. To measure and compare the duration of the active driving activity of the low intensity activities and the dream of female students with "Having a normal" BMI and "Before obesity".

2. METHODOLOGY

The subject of the study are 412 students of first and second year of the Thracian University in Stara Zagora - the Faculty of Economics, Faculty of Medicine and Faculty of Agriculture, trained for the specialty "Veterinary Medicine", "Livestock", "Agriculture", "Fishing and Aquaculture", "Ecology and Environment", "Agricultural Economics", "Regional planning and rural development", "Business Economics", "Agricultural Engineering", of which in this measuring of the whole day energy consumption participated 20 female students with "Having a normal" BMI and 20 female students with BMI "Before obesity".

Applied is anthropometrics. Growth is measured according to the standard methodology, and for measurement of body mass and determining an individual's BMI is used professional medical apparatus of the Japanese firm "TANITA". Applied is the international classification of BMI according to World Health Organization (WHO, 2007). Energy consumption is measured with a multi sensor monitor for the whole day energy consumption Sense Wear Pro 2 Body Monitoring System.

Mathematical-statistical methods are used for quantitative assessment of the examined indicators and comparative method for analysis of data obtained from statistical processing. The t - criterion is used on student, as authentic are accepted differences at the level $p < 0.05$.

3. ANALYSIS OF RESULTS

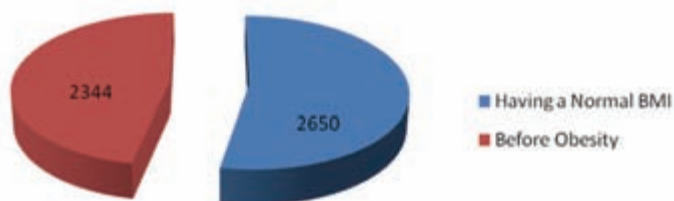


Fig.1 Average values of the common energy consumption (in kcal)

The *fig.1* shows the average values of the common energy consumption, shown in kcal. The total energy consumption includes energy consumption for the necessary functioning of the vital functions at rest (BMR), and the energy consumption, which is required for performing various motor activities. This study notes bigger common energy consumption at the female students with "Having a normal" BMI (2650 kcal) compared with the female students with "Before obesity" BMI (2344 kcal).

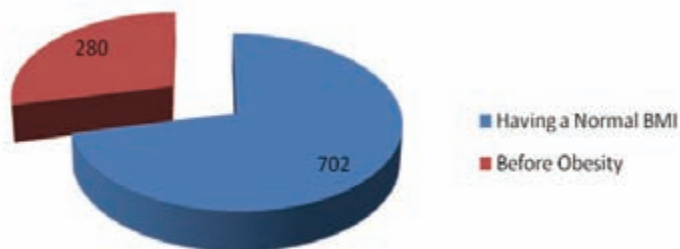


Fig. 2 Average values of energy consumption (in kcal) with active driving activity (3.0 METs)

Fig. 2 graphically represents energy consumption during the active driving activity (3.0 METs) for female students with "Having a normal" BMI and with "Before obesity" BMI. It is well known that the physiological effect from the motor activity consumes energy. Metabolic equivalent (MET) is a unit used to determine the level of energy consumption in specific activity. MET is the ratio of the level of energy consumption during the activity, towards the level of energy consumption in resting. MET determines metabolic equivalent 1.0 METs which is the size of energy consumption in resting. The activity of low intensity is 1.1-2.9 METs; a high-intensity activity is 6 or more METs. As active energy consumption is considered physical activity that lasts 2 consecutive min with 3.0 METs or more [6]. Makes an impression more than two times high energy consumption (in moderately-intense activity (3.0-5.9 METs) for female students with "Having a normal" BMI (702 kcal) compared with the female students with "Before obesity" BMI (280 kcal).

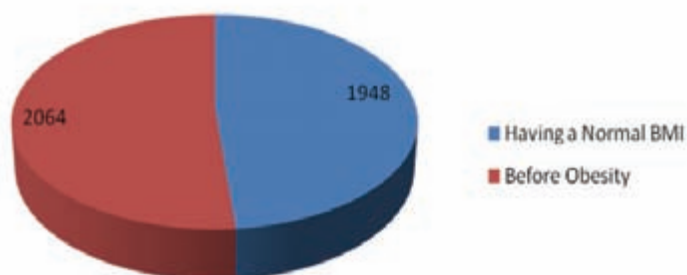


Fig. 3 Average values of energy consumption (in kcal) on low-intensive activity

As stated above, low-intensive activity is 1.1-2.9 METs. From the graphical display of results, seen in **fig.3** is confirmed that the average energy consumption of low-intensive activity of female students with "Before obesity" BMI (2064 kcal) and is greater than the average energy consumption of for female students with "Having a normal" BMI (1948 kcal).

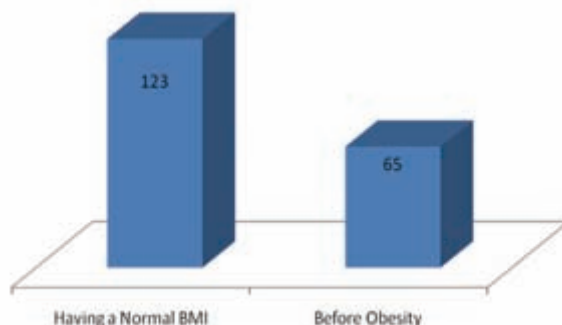


Fig. 4 Average duration values of active driving activity (3.0 METs) per minute

The **fig.4** shows that the duration of moderate-intense activity (according to data regarding the energy consumption during active driving activity (3.0 METs) is almost twice higher at female students with "Having a normal" BMI (123 min) compared with female students with BMI "Before obesity" (65 min).

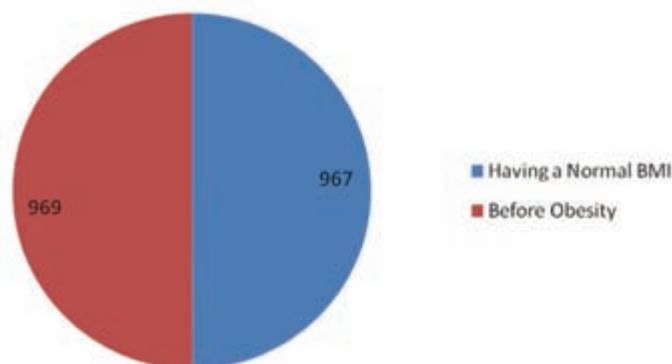


Fig. 5 Average values of the length of low-intensive activity in minutes

The **fig.5** shows almost equal distribution of the average length of low-intensive activity in both groups of tested persons - at female students with "Having a normal" BMI (967 min), and at female students with BMI "Before obesity" (969 min).

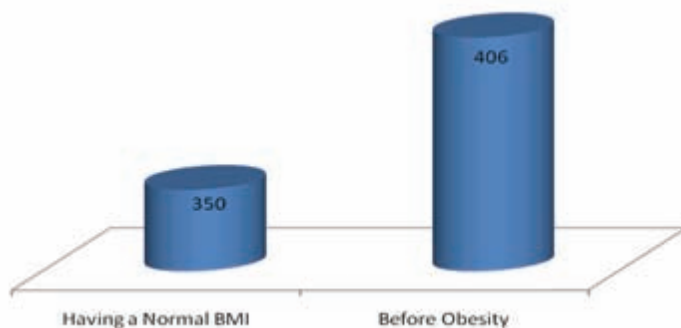


Fig. 6 Average values of dream duration in minutes.

It is known that the need for sleep is strictly individual. Numerous studies in recent years have found that adults need an average 7-8 hours (420-480 min) night's sleep. Sleep is one of the most important functions of the organism, a process in which it is recovering, including its central nervous system [2]. From **fig.6** yet has been confirmed that in both groups of tested persons is determined insufficient length of the dream. According to U.S. doctors insomnia leads to weight gain, because with less than six hours sleep the body fails to break down carbohydrates [8].

The female students with "Having a normal" BMI have less sleep length (372 min) compared with female students with BMI "Before obesity" (406 min). We guess it might appear as a reason for moving a part from the group with normal weight towards the group with excessive weight.

Table 1. Data for comparative analysis of energy consumption

Energy consumption	Having a Normal BMI		Before Obesity			Statistical significance
	\bar{X}	S_1	\bar{X}	S_2	d	
Total energy consumption (kcal)	2650	12	2344	10	8,22	p<0,05*
Energy consumption (in kcal) during active driving activity (3.0 METs)	702	18	280	21	4,08	p<0,01**
Energy consumption (in kcal) at low-intensive activity	1948	14	2064	16	8,18	p<0,05*

Table 2. Data for comparative analysis of the motor activity duration and the dream

Duration	Having a Normal BMI		Before Obesity			Statistical significance
	\bar{X}	S_1	\bar{X}	S_2	d	
Duration of the active driving activity (3.0 METs) in min	123	2	65	1	4,09	p<0,05*
Duration of low-intensive activity	967	18,1	969	17	8,3	p<0,05*
Duration of the dream in a min	350	10	406	13	12,51	p<0,05*

The obtained results are statistically validated. From the results shown in **Table 1** and **Table 2** is shown statistical significance of differences for the tested parameters. The highest importance is the energy consumption of the active driving activity (3.0 METs) - p <0,01. In the total energy consumption, at energy consumption with the low-intensive activity, the duration of the active driving activity (3.0 METs), duration of low-intensive activity and the duration of dream, results are confirmed by statistical probability of p <0,05.

4. CONCLUSIONS AND RECOMMENDATIONS

The results of the survey show that:

1. The overall energy consumption and energy consumption during active driving activity (3.0 METs) is higher at female students with "Having a normal" BMI compared to these female students with BMI "Before obesity".

2. The energy consumption at low-intensive activity of female students with BMI "Before obesity" is bigger in comparison with colleagues who are with "Having a normal" BMI.

3. Extensiveness of the moderate-intense activity among female students with "Having a normal" BMI is greater than female students with BMI "Before obesity", while in terms of the duration of the sleep is observed inverse dependence. The duration of low-intensive activity in both groups is almost equal.

Made findings give us ground to recommend implementation of continuous measurements for monitoring and control the energy consumption especially in the category "Before obesity".

Monitoring and duration of the different according to the intensity motor activities and the sleep state will further expand the opportunities for acquiring and maintaining a normal body mass.

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COMPARATIVE ANALYSIS OF THE DAILY ENERGY CONSUMPTION OF FEMALE STUDENTS WITH A DIFFERENT BODY MASS INDEX

For the acquisition and maintenance of body weight in normal range is necessary to exercise various physical activities. Physical exercises have many positive effects on the metabolism and on the increase of energy consumption. The purpose of this study was to determine the daily energy expenditure for female students with a body mass index "Having a normal" and "Before obesity". Energy consumption was measured with a multi-touch monitor of the daily consumption using Sense Wear Pro 2 Body monitoring system. In addition are the following mathematical and statistical methods for quantitative assessment of the examined parameters and the comparative methods of data analysis obtained from the statistical analysis. There were significant differences in the energy consumption at the examined parameters.

Key words: metabolic age, female student, body mass index "Having a normal" and "Before obesity".

„Dan“, 9. april 2011.

ИНТЕНЗИВНА МЕЂУНАРОДНА САРАДЊА ФАКУЛТЕТА ЗА СПОРТ И ФВ



Домаћини Бугарима: Бјелица, Мирановић и Симоновић

Бугари у Подгорици и Никшићу

У неђељу у тродневну посјету Црној Гори долазе проф. др Лазар Димитров, ректор Националне Спортске Академије у Софији са сарадницима проф. Даниелом Дашевом и доц. др Елеонором Милевом. То је узвратна посјета Факултету за спорт и физичко васпитање из Никшића, чији су студенти и професори крајем јануара ове године посјетили НСА у Софији приликом повратка са практичне наставе скијања из познатог скијашког центра Банско. Делегација НСА ће потписати споразум о сарадњи са Универзитетом Црне Горе у оквиру којег егзистира Факултет за спорт и физичко васпитање из Никшића као најмлађа организациона јединица УЦГ и посјетити те двије институције у Подгорици и Никшићу и разговарати са ректором проф. др Предрагом Мирановићем и деканом проф. др Душком Бјелицом о модалитетима даље сарадње. Планирана је и посјета Црногорском олимпијском комитету, разговор и пријем код председника ЦОК-а мр Душана Симоновића.

Т.Б.