Health behaviour, body composition and motor performance in female university students

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HEALTH BEHAVIOUR, BODY COMPOSITION AND MOTOR PERFORMANCE IN FEMALE UNIVERSITY STUDENTS
ABSTRACT

The aims of this study were 1) to present the health awareness characteristic of the female students, 2) to characterize the differences by groups along the comparison of health behaviour, selected body composition attributes and cardio-respiratory performances variables.

The two groups of the sample; one group consisted of students majoring in teacher training, social pedagogy, tourism and catering, the others are majors in recreation, health promotion courses (n=109); were selected from full-time female students at the University of West Hungary. In our research we used questionnaire (for investigate health behaviour and attitude), the Rockport Fitness Walking Test (for the measurement of cardio-respiratory performance in the sub-max zone to estimate relative VO$_2$max) and InBody 720 bioelectrical impedance scanner (for analyzing body composition). For the analysis, descriptive statistics, one-way ANOVA and Mann Whitney U test were used testing significance at the 95% level of confidence.

Differences between the group members’ health behaviour was found in only one examined dimension, namely physical activity. The results of other indicators (the hours of tiredness, state of health, habits of smoking and alcohol consumption) showed identical values. We have find significant difference between the groups in the following variables: frequency of physical activity, the muscle percentage and the cardio-respiratory performance. With the exception of one segment of body composition and the results of physical activity indicators; probably due to differences in physical activity; the groups can be viewed as strongly heterogeneous.

KEYWORDS: health behaviour, body composition, motor performance, cardio respiratory system

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INTRODUCTION

The political system, the general socio-economic conditions and physical environment has been changed continuous and remarkably during the past 30 years due to the transition from the socialist model to the market economy in Hungary (Bayer and Boda 2009). Therefore the women’s social expectations (work - life balance) grew significantly in this period and for this reason the examination of the women’s health conditions and health behaviour comes into the foreground rather continually (Pongrácz 2001, Kopp and Skrabski 2007). Unfortunately with these positive modifications negative consequences were also associated; namely remarkable and general decrease in the people habitual physical activity (Szeitz-Szabó et. al. 2011, Paulik et al. 2010).

Since the 1970s, common changes in living standards and lifestyles have resulted in the decreasing physical performance of children, adolescence, and young adults, while body fat as a percentage of body mass has increased (Malina and Bouchard 1991, Bouchard 2000). Gálödi (2002) stated that only 30% of those aged between 15 and 84 years perform regular physical activity in Hungary, and there is a linear decrease in sports participation with an increase in age. According to his study, regular physical activity is performed by 49.9% of those aged between 20 and 29 years and there is a significant correlation \( r=0.85 \) between the frequency of physical activities performed and qualification level.

The transition in Hungarian society with its negative characteristic appears in a considerable extent in higher education. During the academic years of college and university, sedentary lifestyles tend to be typical, the direct outcome of which is a change in body composition and cardio-respiratory performance (Kovács et al. 2002). This research area is very important because the effect of future intellectuals for the society; as pattern of healthy life style, of forming attitudes towards physical activity is significant. That is why it is pertinent to observe and measure college student's health behaviour and the factors related to them during their studies, in order to make the necessary changes.

The general aim of this study was to present the health awareness characteristic of the female students. The specific aim was to characterize the differences by groups along with the comparison of health behaviour, selected body composition attributes and cardio-respiratory performances variables. Therefore our research question was: Does previous habitual physical activity have an effect on the characteristics of fitness?

This manuscript will help to clarify the results of the literature in the healthy behaviour, motor performance and body composition in adults. Additionally our paper will give further insights into the connection between physical activity level and body composition, due to the results.
METHODS

A stratified random sample was used in selecting the year and date of enrollment; all of them attended the first semester. The sample (n=109) were selected from teacher training, social pedagogy, tourism and catering, recreation, health promotion courses from full-time female students at the University of West Hungary. The sample was divided into two groups according to mandatory regular physical activity. In this behavioural characteristic, there are significant differences between the two groups. The recreation and health promotion students (n=27) \(M_{age}=19.52\pm1.4\) are engaged in daily compulsory regular physical activity depend on the semester between 2-4 times a week (60-80 minutes each). This health behaviour of the teacher training, social pedagogy, tourism and catering students (n=82) \(M_{age}=19.26\pm0.1\) are at only 30-40 minutes performed ranging from 0-2 times a week.

During our research the following methods were also used. For the measure their health behaviour we used the questionnaire the Győr- Moson- Sopron County ÁNTSZ Health Protection Department’s “Survey of habitude of the Adult Population” method (Bajtay1999). A questionnaire was used which consisted of closed-ended questions and scales in the following fields: self-evaluation (self-confidence, shyness), future prospects (hope, hopelessness), nutritional habits (quality, frequency), harmful addictions (smoking, drug use, and alcohol consumption), and physical activity (regularity, quantity) (Page et al. 2005). Questions were directed to determine the frequency of twenty-minute physical activity periods during the previous seven days, the level of satisfaction in relation to health, the number of hours of tiredness per week, and any harmful addictions, such as smoking or alcohol consumption.

A motor performance test was used for the measurement of cardio-respiratory performance in the sub-max zone with the Rockport Fitness Walking Test to estimate relative VO\(_2\)max \((\text{ml} \cdot \text{kg}^{-1} \cdot \text{min}^{-1})\). The elapsed time was measured with the Rockport Fitness Walking Test, and the relative maximum pulse rate was detected with the Polar Accurex Pulse Rate Monitor and processed and analyzed with Polar Precision Performance 3.0 Software (Version 4.00.020). The relative aerobic capacity of the tested persons was estimated with the program on the website (http://www.brianmac.dempn.co.uk/rockport-hmt). In selecting the test, it was thought, from a methodological point of view, that testing the motor performance of hypoactive persons suitable for their level of activity is the primary criteria of the objective data recording. Based on this, it was assumed that the walk test would be acceptable for the students, and at the same time it would motivate them to perform better. The equation to predict max VO\(_2\) according to Fox's physiological basis for exercise and sport is as follows: Equations to predict max VO\(_2\) use two common field tests. Rockport one-mile fitness walking test: \(\text{VO}_2\text{max} \text{ (ml} \cdot \text{kg}^{-1} \cdot \text{min}^{-1}) = 132.853 - (0.0769 \times \text{body weight}) - (0.3877 \times \text{age}) + (6.315 \times \text{gender}) - (3.2649 \times \text{time}) - (0.1565 \times \text{Heart Rate})\). The students covered the one-mile distance in windless weather conditions with fast walking, the time of which was measured and recorded by a time-measuring appliance.

To determine body composition we measured the height and weight of the students and used the InBody 720 bioelectrical impedance scanners for the estimation of relative body fat.
and muscle mass content (www.e-inbody.com/Tech/paper.html). The InBody 720 (Biospace Co, Korea) is a multi-frequency impedance plethysmograph body composition analyzer which takes readings from the body using an eight-point tactile electrode method, measuring resistance at five specific frequencies (1 kHz, 50 kHz, 250 kHz, 500 kHz, and 1 MHz) and reactance at three specific frequencies (5 kHz, 50 kHz, and 250 kHz). From these body size measures, the body mass index (BMI) was also calculated. The World Health Organization (WHO) has established 11 different categories of BMI. We used three fused categories on the basis of WHO’s categories for the nutritional status (thin = underweight, severe thinness, moderate thinness, mild thinness; normal = normal range; overweight = overweight, pre-obese, obese, obese class I, obese class II, obese class III) (WHO 2004). We used the technical prescriptions of the International Biological Program [Weiner JES, Lourie JA (eds). (1969)].

Statistics for Windows (version 7.1, StatSoft Inc., Tulsa, OK 74104, USA, 2006) was used for the measured and derived data. As the first step of the statistical analysis the conventional descriptive statistical parameters were calculated (mean, variance and variation range) in each group. Differences of the mean values of the groups were analyzed with Analysis of Variance (ANOVA) test, and Mann Whitney U test. During the evaluation of statistical results the maximal allowed random error was 5% for a 95% level of confidence.

RESULTS

The statistical parameters of the examined groups’ anthropometric characteristics are presented in Table 1. Our samples are homogenous regarding age, the relative variances of means are low (0.06% and 0.05%). The examined students regarding their height and weight as in normal/healthy development status (Bodzsár 1999, Fehérné 1999). There were not any significant differences between means of height and body weight, the variance similar to other Hungarian samples (Szakály 2002, Szakály et al. 2003). Relative variance (coefficient of variance) of the mean body weight mainly among social pedagogue-tourism-teacher (STT) students and the differences of end values refer to the body composition’s differences derive from nutritional status. Variances of the average body weight of students from STT faculty (STT: 19.6%), recreation organizer and health developer (RHE) faculty (RHE: 11.7%) and differences of end values (STT: 40-99 kg, RHE: 45-74 kg) refer to significant heterogeneity of the group.

According to the WHO categories, four (14.8%) and eight (9.7%) students were thin from RHE and STT respectively. Twenty one (77.0%) and 54 (65.8%) students belonged to normal categories from the RHE and STT faculty, respectively. And two (7.4%, RHE) and 20 (24.4%, STT) individuals were overweight. We have not found significant differences between two groups. We measured and analyzed two component of body composition. In Table 1 we are presenting the body fat content and the muscle mass values as well. The
muscle mass values are the following: RHE students $41.2 \pm 4.6$ (35.0 – 46.6) and STT students $39.1 \pm 5.0^*$ (25.6 – 46.5). We have found in this characteristic significant difference between two examined groups.

Characteristics of the groups’ health behavior are presented in Table 2. Frequencies of answers for some questions in our questioner regarding health awareness can be seen. We asked about the frequency of free time physical activity lasting for at least 20 minutes per day when examining habits of physical activity. Regarding this question the following scale was used: from never (1) to 7 times a week (8). For the evaluation of own health a 3-point-scale was used (very healthy (1), healthy (2), not properly healthy (3), for the relative fatigue a 4-point-scale (rarely (1), occasionally (2), 3 times a week (3), 4 times a week or more (4), and for the assessment of harmful habits a 5-point-scale (never (1), rarely (2), monthly (3), weekly (4), every day (5).

The frequency of regular physical activity in the RHE group is very diverse. It is thought-provoking that there are nine students whose regular physical activity does not reach the healthy limit, which means 3 times a week. In the STT group the “never” and the 1-2 times a week were the most common answers. This group can be considered hypoactive regarding physical activity. There are no significant differences between the groups regarding the evaluation of own health condition and the presence of fatigue during the week. No significant differences could be revealed between the groups regarding harmful behaviors, like smoking and alcohol consumption. The groups did not differ significantly regarding the evaluation of health condition, the feeling of morning fatigue and the harmful habits – smoking, alcohol consumption. Significant difference between the groups could only be found in the physical activity.

Using tests which measures motor abilities and examining body structure the physical condition of an actual age-group can be estimated. The use of these in the general education is a part of the curricular requirement, but is not very wide-spread in higher education.

For describing the physical activity the Rockport Fitness Walking test was used. Results of the test and estimated, relative aerobe capacity values can be seen in Table 3. The RHE students’ time is “excellent”, while STT students’ time is “good”. Differences between the groups’ means value were significant. Relative variances are mild (RHE 2.1 %, STT 6.4 %), the differences of the end values are not considerable. Variances of mean pulses are between 14.6% and 12.4%, differences of end values are significant in both groups.

**DISCUSSION**

The results of our examination are represent the student’s health behaviour well. We have found similarities between the examined groups in the following lifestyle characteristics: the hours of tiredness, state of health, habits of smoking and alcohol consumption. The
difference of means in frequency of weekly physical activity at muscle mass percent and cardio-respiratory performance are significant.

The height and weight are the most commonly analyzed anthropometric features. These are basic values, both are characteristic index number, although the structure or the body composition cannot be reliably estimated with the body mass index (BMI), calculated either from one value or both (Nagy et al. 1996/97). It needs to be presented, because there are more and more comprehensive and reference data on it. Body mass index was used to assess the nutritional condition. In Hungary no current references of BMI have been prepared, so the mean values of BMI are necessarily evaluated according to the WHO recommendation.

According to the WHO’s categorization both of our groups belong to the normal range. The body mass index is normal in the biggest proportion of the students, in both group (RHE 77.0%, STT 65.8%), but the number of students in the thin and overweight category is also important. Although there is not any statistically significant difference between the groups according mean BMI, but variance of means and differences of the end values shows the heterogeneity of the students’ nutritional status. In the evaluation of frequencies, based on the BMI, the chain of ideas of Cole has to be considered. The authors consider the frequency of thin subjects to be also important while evaluating the nutritional status, although in the developed societies it is a consequence of fashion not the current efficiency (Cole et al. 2007).

The positive benefit of frequent physical activity on body composition is a well-known fact. Ideal amount of body fat content and muscle mass are seen among physically active subjects. There are many methods for the estimation of relative muscle mass. It is more difficult to find valid references when evaluation the data. Recommendations from American data are used during the evaluation of the results. According to Drinkwater and Ross (1980) the optimal body fat content is in five RHE students (18.5%) and 13 STT students (15.8%), average fat content can be found in seven RHE students (25.9%) and 18 STT students (66.7%) people and there are more than the average (dangerous) fat content in 15 RHE students (55.6%) and 41 STT students (50.0%). Frequencies of relative body fat and the differences between the end values are high and need some attention. However in case of relative muscle mass there were significant difference between the groups, although the value of the mean relative muscle mass in the relative physically acting group hardly reaches the minimum level which is required physiologically. The development of the organs of movements among STT students are under the required level due to the slight amount of physical activity. There is not any difference between the mean values of the relative body fat content. Variances are high similarly to other same samples in Hungary (Reigl, 1984, Dallos, Mészáros and ifj. Dallos 1999, Szakály 2002).

Examining the relative body components (body fat and muscle mass) significant difference between the groups was found only in relative muscle mass. However the mean relative muscle mass even in the physically active group only minimally reached the physiologically required limit. Among the STT students, due to the mild intensity of physical activity, the development of the organs of movement is under the required level. Significant proportion of RHE students’ physical activity does not reach three occasions per week, while STT students
are mainly hypoactive. Anthropometric features of the optimal body fat content and muscle mass have only been proved with physically active subjects.

Significant differences between the two groups, regarding healthy behavior, have only been found in the frequency of physical activity from all characteristic. Among Hungarian college students smoking and alcohol consumption are the most frequent harmful behavior. Smoking was reported in 67% of boy and in 61% of girls. Regular alcohol consumption is in 49% of boys and in 27% of girls (Audrain-McGovern, Rodriguez and Moss 2003, Kopp and Skrabski 1995). Our results are well comparable with the results of the European Health and Behavior Survey reported by Kopp and Skrabski (1995). In the healthcare, regarding preventive health-activity, RHE students come closer to the required level only in the field of physical activity. Full awareness of health can only be reached if students change their life style towards health maintenance, so physically active lifestyle only worth if it is associated with healthy habits (Frenkl, 1993).

Analyzing cardio respiratory achievements, by the means values of the groups, significant association was found regarding relative aerobic capacity’s value. Variances are mainly low and the end values are similar. Estimated, active ability of oxygen uptake is closely under the desired value 31,0-34,9 ml/kg/min. (Mészáros 1990). Evident consequence of hypo activity in STT group is that the mean values of the estimated, relative oxygen uptake only reach the lower, required limit. Coefficient of variance pulses are between 14.6% and 12.4%. Differences of end values are prominent in both groups, which illustrate properly the differences of the fitness level. The status of the cardio respiratory system significantly depends on regular physical activity, by the help of moving the process of the decrease of aerobe achievement can be slowed down. Maffeis and colleagues (1994) claim that decreased aerobic activity is basically the consequence of a lifestyle, with decreased occasion for doing exercises. According to the authors the question is more difficult when examining the aerobic achievement’s development in comparison with young people with normal body weight and with overweighed people’s samples. Similar consequences are seen in articles (Fletcher et al. 1992, Bouchard 2000, Cole at al. 2000, Cole et al. 2007). According to the working teams, leading by Cureton et al (1991), interpretation in evaluating cardio respiratory achievements must include the person’s body components or at least the relative body fat level. Among RHE students, the detected optimal muscle mass and the body fat’s level (which is in the normal area) prove the beneficial effect of body component. The effect of unfavorable proportion of muscle and fat effecting aerobe achievement can be clearly associated with the significantly lower cardio respiratory achievements among STT students.

CONCLUSIONS

Results of the tests should be analyzed with the students on theoretical lessons, during which they can be given advices on healthy special condition. We have to pay attention to
recognize that for healthy living, there is a need for reaching and maintaining the proper condition. Some words need to say about relational effect of the preventive and mental hygienic habits, proper diet, physical activity and sports. In addition should be make students conscious of body compositions and the cardio respiratory system’s fitness can be significantly improved by physical activity. These facts also support the need for physical education and the importance of differentiation in the higher education.

SPECIFIC SUGGESTIONS FOR FUTURE RESEARCH AND LIMITATION

In the future it is needed to add many subject and it should be (e.g. longitudinal measurements) detecting the effects and changes with additional examinations as well.

Our examination is not representative therefore the result cannot be using for generalization applying to Hungarian population.

REFERENCES


www.e-inbody.com/Tech/paper.html

www.brianmac.dempn.co.uk/rockport-htm