

## **LEVEL OF PHYSICAL ACTIVITY AND ANTHROPOMETRIC PARAMETERS IN FEMALE MEDICAL STUDENTS**

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(Original scientific paper)

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### **Abstract**

*University students are the youngest population which belongs to the adult human population, 18-64 years of age, with recommended 150 minutes moderate physical activity weekly. It is important for this young population to be informed about these recommendations and health benefits of physical activity. The aim of this study was to determine the level of physical activity of female medical students and their obesity parameters. Material and methods: International physical activity questionnaire (IPAQ) was used for determining the level of physical activity and bioelectrical impedance (InBody 720) for analyzing the body composition. Results: Average age was  $20.2 \pm 1.08$  years. According to the given data students performed  $87.84 \pm 130.06$  minutes weekly of vigorous physical activity;  $178.28 \pm 210.78$  minutes per week moderate physical activity and walking  $248.35 \pm 274.68$  minutes per week. Body mass index (BMI) was normal,  $BMI=22.76 \pm 4.76$ ; body fat percent  $BF\%= 29.41 \pm 8.51$  and waist hip ratio,  $WHR= 0.88 \pm 0.07$ . Conclusion: Female medical students at our faculty reported a significant volume of physical activity but some obesity parameters (BF% and WHR) were moderately high.*

### **Key words:**

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### **Introduction**

Regular moderate physical activity is well known as a beneficial factor for maintaining and improving individual general health. There is insufficient information about lifestyle habits, quantity and quality of physical activity of university student population in our country (Keating et al., 2005). General recommendations for student population are the same as for adult population, minimum 150 minutes moderate physical activity or 75 minutes vigorous activity weekly. The beginning of faculty education is the beginning of a period of life fulfilled with many new obligations which influence the lifestyle of students (Clementa., et al, 2016). At this period of life usually young people who have been physically active become less active, and the duration of time for sport activities suddenly falls down (Bray & Born, 2004). Investigations found that body composition changed in young people during university, in most cases the body fat component increased (Gropper., et al. 2012; Fedewa., et al. 2014).

The recommended volume of physical activity, defined by duration and intensity level, was achieved only by 9% of students from Czech Republic and 45% students from USA (Sigmindova., et al., 2013). Approximately half of the medical students from Thailand (49.5 %) which answered the GPAQ questionnaire achieved satisfactory volume of physical activity (Wattanapisit., et al, 2016). Investigations of patterns of physical activity in students have used direct methods, via devices like pedometers or indirectly through questionnaires. The self-reported measurements of physical activity of university students have shown overestimation compared to the objective volume of physical activity of the subjects tested (Peterson., et al., 2015; Dinger & Behrens, 2006 ).

Excessive level of inactivity is associated with higher health risks in all age groups. A contrary recommended level of physical activity is a good predictor of better somatic and mental health. The most obvious influence of regular physical activity in students is optimal body composition: preferred muscle mass and suitable body fat percent. (Deliens., et al. 2015).

This study focused on PA behaviors and anthropometrical obesity parameters of female medical students. Medical students as future health workers are assumed to be well informed about health enhancing influences of physical activity. On the other side medical students are extremely overwhelmed with study

obligations which are time consuming and dissimulating for engagement in sports activity. Therefore, the aim of this study was to determine the volume of physical activity and obesity diagnoses parameters in female medical students.

### Materials and methods

The study was conducted on a total of 80 female students, third semester Faculty of Medicine, with an age average  $20.2 \pm 1.08$  years. Participants completed a short demographic questionnaire, IPAQ questionnaire and undergone bioelectrical analysis of body composition.

#### *Anthropometry*

The measurements were made in the Laboratory of Sports medicine at the Institute of Physiology, Faculty of Medicine in Skopje. Body mass and height were measured following the standard procedure with a stadiometer and an electronic scale. InBody 720 body impedance analyzer measures body composition using a constant current source with different current frequencies. The 8 electrodes are positioned bellow the toes and heels of both feet and under the palm and thumb of both hands. Among numerous body composition parameters, which derived from body impedance analysis, we choose the obesity diagnosis parameters: weight, BMI, body fat percent BF%, waist to hip ratio WHR, and fat and muscle control (how many fat and/or muscle kilograms has to be decreased/increased).

#### *Assessment of physical activity*

International Physical Activity Questionnaire (IPAQ) in short self-administered form comprises of 7 items that quantify the physical activity (lasting at least 10 minutes) across four different domains of activity during the past seven days. The IPAQ is developed to estimate the total weekly volume of moderate and vigorous intensity activities in a typical week among several domains such as work, transportation and recreational activities. Frequency and duration (minimum 10 minute bouts) of vigorous activity, moderate activity and walking are assessed. Participants also report the amount of time they spend sitting on a weekday. Weekly time spent on vigorous activity, moderate activity and walking is determined by multiplying reported frequency and duration within each category of activity. Total weekly time of physical activity is calculated by summing the tree categories of activities listed above. (Dinger., et al., 2006))

#### *Statistical analysis*

The data was analyzed by descriptive statistical methods using Microsoft Excell 2010. The data were presented in mean  $\pm$  standard deviation.

### Results

The participants' demographic characteristics are explained in Table 1. Our young colleagues were students in third semester of general medicine. The testing was made during the Physiology part 1 course.

Table 1. Descriptive characteristics of the sample

N=80		
age	mean $\pm$ SD	$20.2 \pm 1.08$ year
	min-max	18.5 – 24.0
height	mean $\pm$ SD	$167.16 \pm 5.8$ cm
	min-max	155 – 188 cm
weight	mean $\pm$ SD	$64.09 \pm 14.09$ kg
	min-max	43 – 116 kg

The results of IPAQ questionnaire are presented in Table 2. Number of days of vigorous physical activity, moderate physical activity, walking and sitting during the last seven days and duration of these four domains are shown in Table 2. The mean values, standard deviations and range from minimum to maximum of recorded values for each parameter are noted. Duration of activity sessions are expressed in minutes, but duration of sitting is expressed in hours. 42.5% of participants reported vigorous activity; 70% of participants reported moderate physical activity in the last week and 81.25% walked in the last week. 4 out of 80 students, or 0.05% of participants did not report sitting hours, even 99.95% reported averagely  $41.66 \pm 32.61$  hours spending sitting in a normal week.

Table 2. Physical activity of the sample

IPAQ		Day/week	Minutes/day	Minutes/week
Vigorous	mean $\pm$ SD	1.49 $\pm$ 1.87	22.69 $\pm$ 34.76	87.84 $\pm$ 130.06
	min-max	0 - 6	0 - 120	0 - 480
Moderate	mean $\pm$ SD	3.58 $\pm$ 2.59	39.72 $\pm$ 39.79	178.28 $\pm$ 210.78
	min-max	0 - 7	0-120	0 - 840
Walking	mean $\pm$ SD	5.49 $\pm$ 2.18	38.1 $\pm$ 38.07	248.35 $\pm$ 274
	min-max	1 - 7	10 - 180	20- 840
			Hours/day	Hours/week
Sitting	mean $\pm$ SD	6.3 $\pm$ 2.11	5.33 $\pm$ 4.66	39.06 $\pm$ 33.15
	min-max	0-7	0 - 16	3.5 - 112

Table 3. Obesity parameters of the sample (N= 75)

BIA parameters	mean $\pm$ SD	min	max	recommended
BMI (kg/m <sup>2</sup> )	22.76 $\pm$ 4.76	16.1	38.8	18.5 - 25.0
BF%	29.41 $\pm$ 8.51	13.6	51.3	18- 28
WHR	0.88 $\pm$ 0.07	0.78	1.15	0.75 - 0.85
Fat control minus (kg) N= 55	9.28 $\pm$ 9.72	0.10	39.8	
Fat control plus (kg) N= 18	3.5 $\pm$ 2.8	0.1	10.5	

Descriptive statistics of the obesity parameters are presented in Table 3., 75 students out of 80 participants made bioelectrical impedance body composition analysis. 34 students or 45.3% students had normal BMI value (between 20 - 25). 12% had borderline low BMI, between 18.5 and 20. 21.3% of student were malnourished, with BMI lower than 18.5. Same number of students, 16 students or 21.3% were overweight, BMI > 25. Large numbers of participants, 73.3% of students, have to decrease fat mass, mean amount of 9.28  $\pm$  9.72kg. Significant number of students, 24%, had a lower body fat mass than the recommended value. Only 2 students (0.0026%) had optimal body fat mass.

Body fat percent (BF%) showed following distribution: 44% had BF in normal range (18-28%); 49.3% of students had high BF% and only 5 students (0.06%) showed BF under the 18%.

### Discussion

Regular physical activity practice is considered an important factor in the population's health and life quality. The aim of this study was to evaluate the level of physical activity and body composition in female medical students.

Nowadays, several instruments for evaluation of physical activity level of a given population are available. These methods may vary from electronic monitors to surveys performed through questionnaires (Melanson & Freedson, 1996; Wareham & Rennie, 1998). The data derived from questionnaires are not so accurate like from movement sensors devices, but self-reported methods are cheaper, more available, and allow a great part of the population to be evaluated. The standardized questionnaires are suitable for epidemiological studies (da Silva et al., 2007). Students from this investigation, as group, reported satisfactory values for vigorous activity, 87.84  $\pm$  130.06 minutes per week, and 178.28  $\pm$  210.78 minutes moderate activity. These volumes of physical activity fulfilled medical recommendations for better health. Average sitting time was around 39 hours per week. The standard deviation was very high or higher than mean values for most of the IPAQ parameters which indicates that the data points are spread out over a large range of values. Unexpectedly high percent of students reported involvement in vigorous activities (42.5%) and moderate physical activities (70%). Only 18.75% did not walk during the previous week.

Regarding the obesity parameters derived from bioelectrical impedance analysis mean values for body mass index was optimal, 22.76  $\pm$  4.76 kg/m<sup>2</sup>. Almost half off the students (45.3%) had BMI in normal range. Same number of students (21.3%) showed a BMI lower than 18.5 and higher than 25. It is an interesting fact that the same percent of female students had undernourishment and overweight problems. BMI lower than 18.5 indicates that the person is underweight and possibly malnourished. If a person has BMI over 30 he/she is considered obese. Eight students (10.7%) had BMI higher than 30. Although a significant percent of our students had low and very low BMI (33.3%), only a small number of students, 5 (0.06%) had BF% lower than 18% (BIA lower border).

Regarding the fat control InBody analyzer gave weight control recommendations. Great number of students, 73%, have been counseled to decrease fat mass and 24% of students have been advised to increase their body fat mass. Although 45% of student had BMI in an optimal range, still 73% had sufficient body fat mass. Only 2 students (0.027%) from the group had ideal fat mass and no need to change their body fat mass (0 kg fat control).

Female students from Malaysia, aged 22.72 years, reported  $2.41 \pm 1.54$  days vigorous activity ( $45.32 \pm 35.09$  minutes) weekly;  $2.47 \pm 1.41$  days moderate activity ( $83.0 \pm 90.74$  minutes) and walking  $5.69 \pm 1.54$  days ( $312.4 \pm 184.5$  minutes). Our students reported significantly higher values for vigorous and moderate activity than the Malaysian girls but lower volume of walking time (Rajappan et al, 2015).

The, Indian students were more physically active (61.8%) when compared to Chinese (36.4%), Malay (25.9%) and other races (23.5%) (Schmitz et al., 2002). Female students from Romania reported averagely 451.51 minutes walking weekly, 272.5 minutes moderate activity per week and 244.625 minutes vigorous activity per week (Fagaras et al., 2012). A number of studies conducted to evaluate the physical activity, diet, and fitness status of university students have revealed that the physical condition and nutritional habits of students are very much associated with their own attitudes toward health promotion and illness prevention (Haase et al., 2004; Nasui & Popescu, 2014). When comparing the difference courses, the students from Pharmacy and Dentistry had much lower volume of physical activity than their colleagues from Biology and Physical Education schools (da Silva, 2007).

In the study which investigated the physical activity level of undergraduate students of health and biology sciences, male students BMI was  $23.3 \pm 2.6$  kg/m<sup>2</sup> versus female students BMI =  $19.9 \pm 2.1$  kg/m<sup>2</sup>. The undergraduate female students of Faculty of Physical Education from Brazil showed BMI=  $20.9 \pm 2.2$  kg/m<sup>2</sup>. (Filho et al., 2015). Estimation of BMI in medical students in Pakistan found that 27% male and female students were overweight; obesity was found in 7% of students and 6% underweight students included 8% males and 3% females (Daud & Tariq, 2011). The obesity parameters in female medical students in Bangladesh showed that the prevalence of obesity was as follows: 13.6% were underweight, 48.8%, were normal weight, 32% were overweight and 4.54% were obese. BMI was 23.52. (Akhter et al., 2014). According the referenced publications, the body fat percent, BMI and reported data about physical activity in female medical students from other countries are similar with our results.

## Conclusion

The volume of physical activity among female medical students was found satisfactory. Regarding the obesity parameters, although the BMI was in normal range, the other obesity parameters, WHR and BF% were higher than recommended.

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