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OVERWEIGHT AND OBESITY PREVALENCE IN YOUNG STUDENTS

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ABSTRACT. Introduction. Globally, there is a growing prevalence of overweight and obesity in both developing and developed countries. Until recently, it was perceived that obesity mainly affects middle-aged adults. However, there is a growing trend towards obesity among young adults, especially university students. **Objective.** This study aims to assess the overweight and obesity prevalence and its related factors in a random sample of students selected from 10 faculties of "Babeș-Bolyai" University. **Methods.** This transverse study included a self-administered questionnaire and gathered anthropometric measurements. The population subject of study consisted in 1430 students, of which 694 (48.5%) men and 736 (51.5%) women, aged between 20 and 25 years, (69.4%) from urban environment and (30.6%) from rural environment. The body mass index (BMI) has been used for assessing the weight. **Results**. Amongst women, 64.4% had normal weight, 18.9% were overweight and 5.8% were obese, while amongst men 62.1% had normal weight, 14.1% were overweight and 5.2% were obese. Generally speaking 22% of participants were overweight or obese (24.7% women and 19.3% men). In multivariate regression in younger men coming from a region with higher incomes, conscientiously avoiding fats, alcohol and tobacco consumption, physical inactivity and in older women coming from a region with higher incomes, avoiding fats consumption, cholesterol and post-traumatic stress symptoms have been associated to overweight or obesity. **Conclusions**. The study found a high prevalence of overweight / obesity among university students. Several gender-specific health risk practices that can be used in health promotion programs have been identified.

Key words: *obesity, overweight, physical inactivity*

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REZUMAT. ***Prevalența supraponderalității și obezității la tinerii studenți.*** **Introducere.** La nivel global, există o prevalență în creștere a supraponderalității și a obezității atât în țările în curs de dezvoltare, cât și în cele dezvoltate. Până de curând, s-a perceput că obezitatea afectează mai ales adulții de vârstă mijlocie. Cu toate acestea, devine evidentă o tendință de creștere constantă a obezității în rândul tinerilor adulți, în special studenți în cadrul universităților. **Obiectivul.** Acest studiu evaluează prevalența supraponderalității/obezității și a factorilor asociați acesteia în rândul unui eșantion aleatoriu de studenți din 10 facultăți din Universitatea „Babeș-Bolyai". **Metode.** Acest sondaj transversal a cuprins un chestionar autoadministrat și a colectat măsurători antropometrice. Populația studiată a fost de 1430 de studenți din care bărbați 694 (48,5%) și femei 736 (51,5%), cu vârste cuprinse între 20 și 25 de ani, proveniți din mediul urban (69,4%) și mediul rural (30,6%). Indicele de masă corporală (IMC) a fost utilizat pentru starea greutății. **Rezultate**. În rândul femeilor, greutatea normală a fost de 64,4%, supraponderalitatea 18,9% și obezitatea 5,8%, în timp ce în rândul bărbaților greutatea normală de 62,1%, supraponderalitatea 14,1% și obezitatea 5,2%. În general, 22% erau supraponderali sau obezi (24,7% femei și 19,3% bărbați). În regresia multivariată în rândul bărbaților, vârstă mai tânără, provenind dintr-o zonă cu venituri mai ridicate, evitând în mod conștient grăsimile și colesterolul, inactivitatea fizică, iar în rândul femeilor în vârstă, provenind dintr-o zonă cu venituri mai mari, evitarea grăsimilor și a colesterolului au fost asociate cu supraponderalitatea sau obezitatea. **Concluzii**. Studiul a constatat o prevalență ridicată a supraponderalității/obezității în rândul studenților universitari. Au fost identificate mai multe practici de risc pentru sănătate specifice genului care pot fi utilizate în programele de promovare a sănătății.

Cuvinte cheie: *obezitate, supraponderalitate, inactivitate fizică*

Introduction

Obesity represents a major concern in the field of public health in developed countries. The excessive weight has been associated with several main negative effects on health included, but not limited to cardiovascular diseases, diabetes, some forms of cancer and musculoskeletal disorders (Jensen, Ryan, et al., 2014).

There is a worldwide increasing prevalence of overweight and obesity, both in developing and developed countries (Haidar & Cosman, 2011). Over the past 20 years, obesity rates have tripled in developing countries as they are rapidly becoming more urbanized, due to increase of the consumption of high-calorie foods while adopting a more sedentary lifestyle (Popkin et al, 2012).

Certain studies revealed that the first year undergraduate students experience a significant weight increase (Vella-Zarb & Elgar, 2009) followed by a slowly but constantly weight increase (Gores, 2008).

Young adults aged between 18 and 25 years are in a „transition" phase from teenage to adulthood. Until recently, it was thought that the obesity affects usually the middle aged adults. However, a tendency in constant increase of obesity rate in young adults, especially in undergraduate university students became obvious. (Anderson et al., 2003; Lowry et al., 2000). Many young adults experience significant changes in their lifestyle, leaving their homes and going to university (Butler et al., 2004), starting to work, developing relationships (Burke et al., 2002), pregnancy (Linne, 2003) and raising children (Burke et al., 2004). These transitions are seen as a displacement moment, when young people deal with a feeling of „loss" and „disruption in identity" occurred as they leave their family environment (Scanlon, Rowling & Weber, 2007) and independently initiate new things. These key moments during lifetime cause young adults to become vulnerable to energy imbalance, often resulting in weight gain, that might be ignored at that moment, but leads to further weight gains. It is known that the interaction of social, psychological and biological factors during these transition years can make young adults vulnerable to many risk assuming behaviours (Aucott et al., 2014). However, the effect of these factors can be diminished by positive changes in the behaviour using the constructive experience of their childhood and teenage years (Poobalan et al., 2014). Nevertheless, both positive and negative wellness behaviours formed during this transition to adulthood often persist later in life (Parcel, Muraskin & Endert, 1988) and therefore this represents a crucial phase in the life of an individual (Howarth & Street, 2000). Despite this assumption, young adults have been neglected until recently from the perspective of both research and policies.

The American Heart Association Task Force on Practice Guidelines and The Obesity Society (AHA/ACC/TOS) recommends a 3-5% weight loss of initial body weight for managing the obesity in adults. (Jensen et al. 2014).

Only recently, the developed countries started to recognize the young adults aged between 18 and 25 years as a „vulnerable group" to unhealthy lifestyles leading to overweight and obesity (Jekielek & Brown, 2005). However, in the developing countries, obesity in all age groups has not even been considered as a public health concern until the beginning of 1980-1990 and has been perceived as an issue of the developed countries. In the last two decades, several diet and social-economic transitions changed the anthropometric measurements and health patterns of populations in developing countries (Popkin, Adair & Ng, 2012). While tuberculosis, diarheea and sub nutrition are

far from being solved especially in some developing countries, the obesity rate is increasing and it is considered as a challenge for health care infrastructure and medical care providing services in developing countries (Unnikrishnan et al., 2012). This current obesity epidemics is more observable in the developing countries enduring fast epidemiological transitions (demographic, social and economic), with a predictable tripling increase of the obesity incidence in the near future (Jones-Smith et al., 2012).

In cross-sectional studies, for both men and women, BMI, waist circumference and waist hip ratio increase with age from 15-19 years to 20-29 years, however this has been observed especially in men (Gupta et al., 2009). The incidence increase with age trends have been observed not only in terms of weight gain, but also in terms of other cardiovascular risk factors (Gregory CO. et al. 2009).

One study analysing 22 low- and middle-income countries, was conducted among 15,746 students with an average age of 20.8 years from 22 universities. This study revealed that in general, 22% of young adults were obese, with men (24.7%) being more than women (19.3%) (Peltzer et al. 2014). In addition, the researchers concluded that men have an average age younger (16-19 years) than women (22 years or over). However only in sub-Saharan Africa and Latin America, the female obesity was higher, while in Asia and North Africa (excepting Egypt and Tunisia), male obesity was higher than female obesity. It is not yet clear whether this relates to the social disadvantages that women in Asia/North Africa might face.

The goal of study

The goal of this study is to assess the prevalence of overweight and its related factors among the young students of "Babeş-Bolyai" University of Cluj-Napoca.

Research methods

A cross-sectional study was carried out on a sample of Romanian students (N = 1430, men = 694, women = 736) young population aged between 20 and 25 years. The sample was selected from urban and rural areas: urban area (69.4%), rural area (30.6%). The students are enrolled in 10 faculties within "Babeş-Bolyai" University.

The study methods used consisted in:

- *Anthropometric measurements*

The method used for measuring the two body indicators: height and weight. The students were weighed and measured using standardized protocols. The height in standing position was measured at the closest to 0,1 cm without shoes, using a stadiometer. The participants wearing light clothes were weighted at the closest to 0.01 kg using a digital weighting machine, first calibrated using a standard weight and then re-checked daily. The body mass index (BMI) was computed as weight in kilos divided to height in square meters, according to WHO (World Health Organization, 2007).

- *Social variables*

Three elements of the Social Support Questionnaire were used to assess the perceived social support (Brock, 1996).

As in previous researches, the questions were selected to evaluate the perceived tangible and emotional support: "If I were sick and needed someone to take me to a doctor, I would have trouble finding someone (reversed); I feel that there is no one to share my most private concerns and fears (reversed); and I feel a strong emotional connection with at least one person." – The alpha Cronbach for this social support index was 0.95.

The social-demographic questions included the age, the gender and marital status. The social and economic background was assessed using the average household income of each area considered as high (the highest income 25% of incomes), above average (income between 50% - 75% of incomes), below average (income between 25% - 50% of incomes), and low (the lowest income of 25% income).

- *Health risk behaviour*

Physical activity was evaluated using short self-administered version of the International Physical Activity Questionnaire (IPAQ) for the last 7 days (IPAQ-S7S). I used the instructions in the IPAQ manual for reliability and validity, detailed in another chapter (Craig et al., 2003). I ranked the physical activity (short form) according to the official scoring protocol (IPAQ) as low, moderate and high.

- *Eating behaviour variables*

Fruits and vegetables (F&V) consumptions was rated using two questions "How many fruit servings do you typically eat in a day?" and "How many vegetable servings do you typically eat in a day?" and I used the data from the last 24 hours

as standard data (Hall, 2009). The Alpha Cronbach for this measurement of fruits and vegetables consumption was 0.74. Insufficient consumption of fruits and vegetables has been defined as less than five servings of fruit and/or vegetables per day.

Supplementary variables included: the frequency of red meat consumption (daily, 2-3 times a week, once a week, less than once a week, never); the attempt to avoid the consumption of aliments rich in fat (yes, no); the attempt to eat aliments rich in fibres (yes, no); frequency of snacks between meals and number of meals per day.

- *Data analysis*

The data of individual measurements were statistically processed on the computer using the statistical package for social sciences: version 20.0 SPSS Inc. (SPSS). Sociodemographic factors, social and diet variables, health risk behaviours, and BMI categories were calculated as percentages. Multivariate logistic regression was separately performed in men and women, using the overweight/obesity as dependent variable. Potential multicollinearity between variables was assessed using variance inflation factors, none of which exceeded the recommended critical value of 4.0. Social and demographic characteristics, social and health risk behaviour were considered as independent variables. $p < 0.05$ was considered as being significant.

Results

A total number of 1430 students, 49.5% were men (N = 694), and 50.5% were women (N = 736). The average age was 22 years (22.88 ± 1.39 young men and 22.60 ± 1.39 young women). 69.4% participants came from urban area while 30.6% came from rural area. In this study, the prevalence of overweight and obesity was 16.3% and 10.2%, respectively. As we notice in the data presented in Table 1, women have a higher percentage of overweight and obesity than men (17.8% -13.1% vs. 13.3% -7.9%, $p < 0.05$).

Table 1. Distribution of BMI depending on the reported average age, measured height and weight and calculated BMI and weight status among urban and rural students, males and females.

Zone	**N**	Age	Height m.	Weight Kg.	BMI	**Normal weight** BMI 18.5-24.9(%)	**Over weight** BMI 25-29.9(%)	**Obesity** BMI >30(%)
Men								
All	694	22.88 (1.39)	1.73 (0.09)	67.2 (13.1)	22.5 (4.1)	75.9	13.3	7.9

Zone	N	Age	Height m.	Weight Kg.	BMI	**Normal weight** BMI 18.5-24.9(%)	**Over weight** BMI 25-29.9(%)	**Obesity** BMI >30(%)
Men city	402	21.6 (2.6)	1.75 (0.08)	77.2 (17.5)	24.9 (5.0)	75.3	13.4	8.1
Men village	247	21.4 (3.7)	1.72 (0.06)	69.2 (12.1)	23.5 (3.6)	76.9	11.7	6.3
Woman								
All	736	22.7 (2.6)	1.60 (0.08)	57.1 (11.9)	21.9 (4.2)	64.3	20.5	12.8
Woman city	459	21.6 (3.0)	1.64 (0.07)	68.4 (21.3)	25.5 (7.7)	64.3	20.5	12.8
Woman village	277	20.8 (2.8)	1.59 (0.06)	58.3 (9.2)	23.0 (2.8)	71.0	15.9	10.1

No significant differences were found between the average BMI values of students coming from rural and urban areas, either in young men ($p = 0.70$) or in young women ($p = 0.630$); instead, there is a significant difference between the average BMI rates in young women (20.28 ± 3.73) and young men (19.8 ± 3.64) ($p = 0.19$).

Table 2. The prevalence characteristics of subjects considering the overweight by gender among students

Variable	**All**	**Men**	**Woman**	**Statistics**
	M	M	M	P-value
Socio-Demographics				
Age (years)				< 0.001
20-21	21.9	18.9	26.5	
22-23	19.6	18.3	21.5	0.004
24-25	25.6	24.5	26.6	
Health risk behaviour				
Wealth				
Wealthy	25.8	31.8	19.6	
Good enough	22.1	25.7	19.6	< 0.001
Not too well	22.1	23.4	21.3	< 0.001
Not good at all	21.1	21.6	20.5	
Physical Activity				
Low	22.5	26.6	20.5	
Moderat	20.9	24.2	18.5	< 0.001
High	22.0	22.8	20.9	
Dietary				
Number of meals per day	0.7	0.7	0.7	< 0.001
Number of snacks	0.8	0.8	0.7	< 0.001
Vegetables and fruits (time/day)	22.0	24.8	19.9	< 0.001
Eats meat at least once a day	22.7	25.1	23	< 0.001
Avoid fat	25.0	28.0	23.6	< 0.001
Eat fiber	23.9	26.4	22.9	< 0.001

In general, 22% were overweight or obese; women (24.6%) were significantly more overweight or obese than men (20.1%).

Table 3. Associations between overweight/obesity BMI and health and eating behaviour

Variable	Men		Woman	
	UOR	AOR	UOR	AOR
Socio-Demographics				
Age (years)				
20-21	1.00	1.00	1.00	1.00
22-23	0.78***	0.76***	0.99	0.91
24-25	1.00	0.95	1.40***	1.37***
Health risk behaviour				
Wealth				
Wealthy	1.00	1.00	1.00	
Good enough	0.75*	0.95	1.00	
Not too well	0.66***	0.85	1.09	
Not good at all	0.60***	0.73	1.10	
Physical Activity				
Low	1.00		1.00	
Moderat	1.08		0.97	
High	1.06		0.89	
Dietary				
Number of meals per day	1.04		0.98	
Number of snacks	1.02		1.02	
Vegetables and fruits (time/day)	0.93		0.95	
Eats meat at least once a day	1.03		1.04	
Avoid fat	1.35***	1.30***	1.37***	1.27***
Eat fiber	1.15*	1.03	1.31***	1.15

Bivariate analysis among men found that the younger age, 20-21 years, the eating behaviour (aliments rich in fibres, avoidance of fats), health risk behaviour (physical inactivity) were associated with overweight or obesity, while in the multivariate regression analysis the younger age 20–21 years, the eating behaviour (avoidance of fats), the health risk behaviour (physically inactive) were associated with overweight and obesity.

Bivariate analysis among women revealed that the older age, 24-25 years, the eating behaviour (aliments rich in fibres, avoidance of fats) were associated with overweight and obesity, while in the analysis of multivariate regression the older age and the eating behaviour (avoidance of fat) were associated with overweight or obesity.

Discussions

Most of developing countries face a higher prevalence of overweight/ obesity in women, with some exceptions. Obesity increases with age, but among young adults from developing countries the average weight gain of 1 kg per year is higher than that observed in young adults from developed countries (0.4-0.9 kg / year) (Lahmann et al., 2000). Once with the increase of obesity observed in such short period of time, between 16-25 years, a logical observation would be to intervene earlier. However, the young people in the transition period are very different from their younger selves with parental influences. Between 16-25 years, they are sufficiently independent to assume the risks involved by their lifestyle behaviours, and their future health is not a priority for them. The ideal age to make an intervention to this heterogeneous age group is a problem faced by other researchers of diseases, however around the age of 21, they realize that they should improve their lifestyle (Poobalan et al., 2014).

Economic progress and industrialization in many developing countries have caused massive transitions from rural to urban regions, which led to many lifestyle-related changes, resulting in increased obesity rates and cardiovascular risk factors.

Of the young adults aged 18 to 22, the BMI was significantly higher in men and women living in urban area than the ones living in rural areas, with a tendency to higher waist-hip ratios among young adults in urban areas, although this was significant only in men (Bhongir, Nemani & Reddy, 2011).

The studies revealed that while 70% of young people in rural areas and 13.8% of young people in urban areas were underweight (data are not presented), 3.5% of young people in rural areas and 31.9% of young people in urban areas were overweight or obese (OW/obese).

The tenfold increase in the prevalence of OW/obesity in young people in urban areas is a cause of concern. By contrast, in Guatemala (Torun et al., 2002), both urban women coming from rural areas (migrants) and women (non-migrants) living in rural areas tended to be overweight; however, only men living in urban areas were more overweight than the men living in rural areas. Regardless of the BMI, men and women living in rural areas had more abdominal fat than those living in urban areas and all of them, regardless of gender or location, had lower level of physical activity.

It has been observed that the women living in rural areas (non-migrants) had lower HDL compared to migrants, and that is another indicator of cardiovascular diseases. No difference was found in Uganda in what concerns the prevalence of overweight between urban and rural areas (Baalwa J. et al., 2010).

In the adult population of Romania, the prevalence of overweight and obesity is extremely high compared to the world average published by the WHO. According to a study made by (Popa et al. 2020) on 900 people aged 18 to 65 years, 29.56% were overweight and 21.33% were obese.

In 2016, another study reported a higher incidence, according to which 34.7% of the population in Romania aged 20 to 79 years were overweight and 31.9% were obese. (Popa et al., 2016).

An unexpected discovery of this study was that making a conscious effort to avoid fat and cholesterol and an attempt to eat food rich in fibres were associated with overweight/obesity. It is possible that students who were overweight or obese in this study, could have already adopted a healthier eating behaviour to lose weight and be accepted by their peers. As the study project was cross-sectional, the relationship cause-effect between diet variables and overweight/obesity could not be established.

The finding in this study that the lack of physical activity was associated with overweight/obesity was also found in a number of previous studies. In this study, the male students were physically more active than women, and physical inactivity was linked to overweight/obesity among men, but not among women.

Other researchers did not find a connection between physical inactivity and overweight/obesity in either male or female students, despite the fact that men are more likely to engage in exercise in their spare time (Arroyo et al., 2000).

Other studies reveal that the relationship between BMI and physical activity occurs only in males (Gómez, 2009). Despite these differences, it was established that there is a connection between obesity and a sedentary lifestyle.

Conclusions

Young adults (18-25 years) are prone to overweight and obesity during the transition from adolescence to adulthood in developing countries, in the same measure as in developed countries. The prevalence of overweight and obesity was 26.5% in the study among students aged 20 to 25 years.

The prevalence of overweight and obesity was higher among young women than among young men. The prevalence of overweight is higher in young women living in urban areas (33.3%) than in young men living in urban areas (23.5%). Even in this period of age (18-25 years), the overweight and obesity levels increase with age. We can observe in our study that the overweight and obesity among young people aged 20 to 22 years increase, while at the same time there is a gradual decrease of overweight and obese people aged 23 to 25 years, in both sexes.

The study revealed a high prevalence of overweight/obesity in undergraduate students. Several gender-specific health risk practices have been identified that can be used in health promotion programmes.

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