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Overweight and Obesity in Portugal Higher Education Students

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Abstract

Purpose. Overweight and obesity arise, essentially, as a consequence of the adoption of poor eating habits and sedentary lifestyles. Being the teenager a "microworld" in transformation, is intend to characterize and compare (gender) body composition parameters in Higher Education students. **Methods.** The characterization was performed through univariate analysis and the comparison using Mann-Whitney test, for a statistical significance level of 5% (p<0.05). **Results.** Female students presented less satisfactory results in Waist Circumference (WC) and Waist-Hip Ratio (WHiR), male students in Body Mass Index (BMI) and Waist-Height Ratio (WHeR), and there are statistically significant differences in 3 of the 4 parameters (WC, WHiR and WHeR). **Conclusions.** These results may be useful to define strategies to combat overweight and obesity, considering the characteristics of this specific population.

Keywords: obesity, students, sedentary lifestyle,

Introduction

Overweight and obesity can be defined by an excessive and/or not proportional accumulation of body fat. Their prevalence is mainly due to poor and unbalanced eating habits (Pereira, 2006; Souza, Barbosa, & Martins, 2016) and sedentary lifestyles, with high rates of sport and physical inactivity (Berlese, Berlese, Costa, Renner, & Sanfelice, 2016; Cardoso, D'Abreu, Ribeiro, & Bouzas, 2010). Both are risk factors, associated with a bigger possibility of having muscular and skeleton diseases, diabetes, cardiovascular diseases and/or even some types of cancer (World Health Organization, 2016; Strasser, 2013). Globally, obesity cases have more than doubled since the 1980s (World Health Organization, 2016). In Portugal, and according to the National Institute of Statistics, in 2014, more than half of the population over 18 years of age have overweight or obesity, with a higher prevalence in the male gender (Instituto Nacional de Estatística, 2016).

Over the last few years there has been an increasing awareness (social and political) of this problem. In Portugal, an example of that is the recently implemented programs by the Directorate-General of Health, which proves that this issue is increasingly treated in a public health perspective. The national program for the healthy food promotion (Direção-geral da Saúde, 2014), since 2012, and the national program for the physical activity, health and welfare promotion (2016) (Direção-geral da Saúde, 2016) are specific examples of concrete strategies adopted to reduce overweight and obesity, physical inactivity and poor/unbalanced eating habits.

Recently, were made some studies about the overweight and obesity prevalence in higher education students (Amani, Fathi, Farzaneh, Kahnamouei-Aghdam, & Goudarzin, 2016, Carvalho, & Tamasia, 2016, Fontes, Bridges, & Vianna, 2012; Price, Whitt-Glover, Kraus, & McKenzie, 2016). Most of the higher education students can be considered teenager, based on the chronological limits defined by the World Health Organization (10-19 years) and the United Nations Organization (15-24 years) (Eisenstein, 2005). The studies of Amani et al. (2016), Carvalho and Tamasia (2016),

Fontes et al. (2012) and Price et al. (2016) report the issues of overweight and obesity, an increasingly unbalanced/poor diet and a sedentariness lifestyle in this age group, both in general terms and comparatively between male and female teenagers, with no consensus about the higher prevalence's of overweight/obesity according to their gender.

Bouzas (2011) considers the teenager as a "microworld" in transformation. As a higher education student, this "microworld" is still more specific. The consequences of not appropriated and poor habits (unbalanced diet and physical inactivity) during the period as a student, may result in serious problems for the rest of their life, for the negative impact in the increasement of overweight/obesity, risk factor related with the development of some diseases (eg., diabetes, cardiovascular diseases) (World Health Organization, 2016).

By the importance that body composition (overweight and obesity) can have in the public health domain, the main objective of this research is: to characterize and compare (by gender) the body composition of Portugal Higher Education students, considering: Body Mass Index (BMI); Waist Circumference (WC); Waist-Hip Ratio (WHiR); and Waist-Height Ratio (WHeR). The importance of this study is reflected in these indexes' diagnosis, that allow to classify and compare the body composition (overweight and obesity) of this specific population and examine the statistically significant differences possibility according to the variable under comparison (gender).

Materials and methods

Participants

Participated 168 students from a Higher Education Polytechnic School of Portugal, aged between 18 and 24 years old [Mean (M) ± Standard Deviation (SD) = 20.50 ± 1.39), 100 (59.52%) female and 68 (40.48%) male.

Materials

A specific tape-measure for the circumferences (waist and hip), a scale (weight) and stadiometer (height) were used. The applied

anthropometric assessment protocols are the recommended by the American College of Sports Medicine (2014). To collect data, two evaluators was recruited. They were trained, considering the phases that should be respected and their particularities (eg, use of light clothing and preferably barefoot to collect body weight value), so that the data collection can be standardized and statistically valid.

Procedurs

First, the president of the school was contacted. Was explained the scope and purpose of the investigation and requested formal authorization for data collection. After this prior contact, and due authorization, professors were also contacted to schedule the dates. On the collection day, all participants were strictly informed about the scope/purpose of the study and the confidentiality of the results dissemination.

Data analysis

In addition to the BMI, according to Carnero and García (2015), regarding other possible anthropometry analyzes for body composition assessment, was presented and analyzed the values of WC, WHiR and WHeR. For characterization and comparison was considered the indexes and classifications, associated with normative reference values, as recommended by the American College of Sports Medicine (2014):

1) BMI [underweight (<18.50), normal weight ([18.50; 25.00[), overweight ([25.00; 30.00[), obesity (≥30.00)];

(2) WC [normal risk (<94), increased risk ([94;102]), greatly increased risk (>102) for male; normal risk (<80), increased risk ([80; 88]), greatly increased risk (>88) for female];

(3) WHiR [low risk (<0.83), moderate risk ([0.83; 0.88]), high risk ([0.89; 0.94]), very high risk (>0.94) for male and low risk (<0.71), moderate risk ([0.71; 0.77]), high risk ([0.78; 0.82]), very high risk (>0.82) for female];

(4) WHeR [low risk (<0.50) and high risk (≥0.50), for male and female].

The characterization of the dependent variable (gender) was performed through the univariate statistic and the comparison through the Mann-Whitney test. The effect size was obtained by

$r = | z | / \sqrt{n}$, where n is the total sample and z is the value obtained after the Mann-Whitney test (Pallant, 2011). The classification was performed according to the criteria (Pallant, 2011): very small (r<0.10), small (0.10≤r<0.30), moderate (0.30≤r<0.50), large (r≥0.50). Statistical analysis was performed using IBM Statistical Package for Social Sciences (version 23.0), for a significance level of 5% (p<0.05).

Results

Figure 1 shows the frequencies and percent values according to each one of the categories of the variables under study (BMI, WC, WHiR, WHeR). In addition to these indexes, which allow us to characterize the Higher Education students, the p values of the Mann-Whitney test are presented, to compare and confirm the statistically significant differences existence between the male and female gender.

Figure 1. Characterization and comparison according to the students' gender.

n=168	Male (*n*=68)		Female (*n*=100)					
	n	%	*n*	%	*n*	%	*p*	*r*
BMI								
Underweight	12	7.14	2	2.94	10	10.00		
Normal weight	135	80.36	56	82.35	79	79.00		
Overweight	20	11.90	10	14.71	10	10.00		
Obesity (level I)	1	0.60	0	0.00	1	1.00	0.133	0.116
Obesity (level II)	0	0.00	0	0.00	0	0.00		
Obesity (level III)	0	0.00	0	0.00	0	0.00		

WC								
Normal risk	151	89.88	65	95.59	86	86.00	0.041*	0.486
Increased risk	14	8.33	3	4.41	11	11.00		
Greatly increased risk	3	1.79	0	0.00	3	3.00		
WHiR								
Low risk	46	27.37	38	55.89	8	8.00	0.001*	0.534
Moderate risk	64	38.10	22	32.35	42	42.00		
High risk	43	25.60	7	10.29	36	36.00		
Very high risk	15	8.93	1	1.47	14	14.00		
WHeR								
Low risk	140	83.33	46	67.65	94	94.00	0.001*	0.346
High risk	28	16.67	22	32.35	6	6.00		

By the analysis of all the evaluated students (n=168), through the BMI it is possible to verify that 12 have underweight (7.14%), 135 normal weight (80.36%), 20 overweight (11.90%) and 1 obesity (0.60%). By the WC, relating the obtained indexes with the risk of cardiovascular diseases prevalence, it is possible to verify that 151 are classified as having normal risk (89.88%), 14 increased risk (8.33%) and 3 greatly increased risk (1.79%). By the WHiR, 46 are classified as having low risk (27.37%), 64 moderate risk (38.10%), 43 high risk (25.60%) and 15 very high risk (8.93%). Finally, through the WHeR, is possible to verify that 140 are classified as having low risk (83.33%) and 28 high risk (16.67%).

Considering the gender, by the BMI it is possible to verify that, in male Higher Education students, there are 2 classified as having underweight (2.94%), 56 normal weight (82.35%) and 10 as overweight (14.71 %). In female students, 10 have underweight (10.00%), 79 normal weight (79.00%), 10 overweight (10.00%) and only 1 obesity (1.00%). There were no students classified with the levels II or III of obesity. After applying Mann-Whitney test it was found that there were no statistically significant differences between the gender, at the BMI (p=0.133, r=0.116, small effect size). Although not statistically significant, it is possible to verify that

the male Higher Education students present higher values of overweight and obesity (14.71%) than females (11.00%).

Through the WC, in the male gender, there are 65 students classified as having normal risk (95.59%) and 3 as increased risk (4.41%). On the other hand, in the female gender, there were 86 students classified as having normal risk (86.00%), 11 as increased risk (11.00%) and 3 as greatly increased risk (3.00%). After applying the Mann-Whitney test, was verified that there are statistically significant differences between the gender at the WC level (p=0.041, r=0.486, moderate effect size). Based on the results, and their association with the cardiovascular diseases prevalence risk, it is possible to confirm that female students have increased and greatly increased risk (14.00%) higher than male students (4.41%).

Regarding to the WHiR, was verified that in the male students there are 38 classified as having low risk (55.89%), 22 as moderate risk (32.35%), 7 as high risk (10.29%) and only 1 as very high risk (1.47%). In female gender, there were 8 students with low risk (8.00%), 42 with moderate risk (42.00%), 36 with high risk (36.00%) and 14 with very high risk (14.00%). Was also confirmed the existence of statistically significant differences, by the Mann-Whitney test (p=0.001, r=0.534, large effect size). By the association of the obtained results with the cardiovascular diseases prevalence risk, it is possible to verify that the female students present moderate, high and very high risk (92.00%), when compared with the male gender (44.11%).

Finally, through the WHeR, in the male students there are 46 classified as having low risk (67.65%) and 22 as high risk (32.35%). In the female gender there are 94 students with low risk (94.00%) and 2 with high risk (6.00%). After Mann-Whitney test application, is possible to verify that were statistically significant differences between the gender at the WHeR classification (p=0.001, r=0.346, mean effect size). Like the previous analysis, based on the obtained values and their association with the cardiovascular diseases' prevalence risk, it is possible to confirm that the male gender presents superior high risk (32.35%) than female (6.00%).

Conclusions

Considering the defined objective, for the BMI, WC, WHiR and WHeR, the results are not consensual. Gender-comparative analysis has shown that there are no statistically significant differences in BMI. Comparing the gender students through the WC, WHiR and WHeR, shows statistically significant differences between both groups (male and female).

Such significant differences do not tend to be always associated with the same gender. The female has an increased and a greatly increased risk (14.00%) higher than the male (4.41%) for the WC. The same was verified by the WHiR analysis, with the moderate to high risk in female Higher Education students (92.00%) being much higher than the obtained values for the male students (44.11%). On the other hand, trough the WHeR, the male gender has a high risk (32.35%) much higher than the female (6.00%). This incongruence of results confirms the studies analyzed, which sometimes refer to a higher prevalence of overweight/obesity in male students (Fontes et al., 2012), while others refer to a higher prevalence of overweight/obesity in female (Amani et al., 2016).

By the analysis of the variables that integrate the mathematical formulas for BMI, WC, WHiR and WHeR calculation, it is possible to verify that female Higher Education students present less satisfactory results in the parameters that consider the waist circumference (WC, WHiR). On the other hand, Higher Education students of the male gender have worse results in parameters that consider the height (BMI, WHeR).

The young-adult years represent a critical transition period, where people leave home and establish more independent lifestyles than they have had up until that moment. This transition may involve other striking events, which somehow contribute to a gradual increase in overweight and obesity (Price et al., 2016). The same authors report that, despite the importance of this phase, strategies to prevent weight increase are limited and the few that exist have favorable short-term effects on body composition improving and,

as a consequence, improving overall health. Body composition, beyond the fact that could be regularly used to assess overweight/obesity levels, can and should be considered in the determination and adoption of some community strategies for overweight and obesity prevention (Souza et al., 2016, Cardoso et al., 2016, Lindsay, Hongu, Spears, Idris, Dyrek, & Manore, 2014).

As a preventive measure, any person, student or with any other professional occupation, should choose an adequate and balanced diet (Souza et al., 2016) and engage in regular practice of physical/sport activity (Cardoso et al., 2016, World Health Organization, 2016). There are clear evidences of the physical activity effectiveness in primary and secondary prevention of chronic diseases and in life quality improvement, whereas physically active persons are considerably less likely to have overweight/obesity (American College of Sports Medicine, 2014).

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