Research Article

Assessing Physical and Demographic Conditions of Freshman "15" Male Medical Students

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Abstract

Objectives: Anthropometric conditions of college students following their admission to college programs is one of the concerns of health authorities as well as the health policy makers. The concept of 'Freshman 15' is a popular term that describes dramatic weight gain of college students. This research was designed to examine the anthropometric conditions of newly admitted medical students.

Methods: 51 male students aged 19 - 21 years old admitted to the undergraduate programs in colleges of medicine at Kashan University of Medical Sciences participated in this cross sectional study. Demographic characteristics of the participants including age, weight, waist and hip circumferences sizes were measured and recorded. Flexible tape was used to measure waist and hip circumferences sizes in centimeter. The data were analyzed using ANOVA and Pearson correlation tests with the significant levels of $P \leq 0.05$.

Results: The result indicated that only 16 (34.4 percent) of the admitted students had normal weight while 26 (51 percent) were overweight and 8 (15.7 percent) were fat. In addition, 18 (35.3 percent) were in age 18 group, 15 (29.4 percent) in age 19 and 18 (35.3 percent) were in age 20 group. The result of one-way ANOVA suggested that there was a significant difference between the BMI of the age group of 18 to the 19 and 20 years old (respectively, $P = 0.02$, $P = 0.03$), while no significant differences was found between the age group 19 and 20 years old ($P > 0.05$).

Conclusions: The result suggested that a considerable proportion of newly admitted male medical students are already overweight or fat prior to starting their medical education. Further research is needed to follow the weight changes after they start their medical education.

Keywords: Freshman 15, Anthropometry, Waist-Hip Ratio, Body Mass Index

1. Background

Anthropometric conditions of college students following their admission to the college program is one of the concerns of many health authorities as well as the health policy makers. The concept of 'Freshman 15' is a popular term that describes dramatic weight gain of college students. The term is very popular in the western literature and numerous research articles have examined this issue for decades (1, 2). The concept is based on the belief that students usually gain unusual weight in their first year of studying in university. More specifically, it means that most students gain 15 lbs (6.8 kg) of weight in their first year of college (3, 4). The abundance of research articles has even led to the publication of research reports in the form of meta-analysis (5). There have been controversial results regarding the 'Freshman 15'. An exaggeration on the data on some magazine articles and Internet Web sites regarding a gain of 15 lbs among freshman students can be seen. Although, actual weight gain has been found ranging from 1.6 lbs (0.73 kg) to 8.8 lbs (3.99 kg), some studies have even found that no significant weight gain occurs in the first year of college (6-8). The abnormal weight gain and obesity has been reported as an epidemic phenomenon according to the world health organization (WHO), with an approximate number of 1.4 billion worldwide overweight and 300 million persons clinically obese (9, 10). Governments and health organizations are trying to do the necessary strategies to prevent the negative consequences of obesity such as cardiac, endocrine and cancer diseases (11). Adolescent obesity in particular has been shown as a high risk factor all over the world. For example, in the United States, the rate of obesity and overweight has been dramatically increased up to 35% in adolescents aged 12 - 19

years old in 2011 ([12]). In those late adolescent years and early adulthood, transition from secondary school to university is a critical and vulnerable period for body weight changes and unhealthy lifestyle adoption ([12]). Despite the significance of the subject with respect to the health of the students during their first year or undergraduate programs, limited number of research findings is available in regard to the anthropometric condition of the students at the time of admission to the programs ([13]). Therefore, this study was designed to assess some of the selected anthropometric characteristics of male students admitted to Kashan University of Medical Sciences.

2. Methods

51 male students admitted to the undergraduate programs in colleges of Medicine of Kashan University of Medical Sciences participated in this cross sectional study in 2014. All the students completed a human consent form and ethical committee of the university approved the research project. Demographic characteristics of the subjects including age, weight, waist and hip circumferences sizes were measured and recorded. Each student completed a questionnaire including the age, residential address, gender, history of illness, health history. All the measurements were made by health professional at the time of registration. Seca scale equipped with adjustable height bar made in Germany was employed to measure the height and weight. Weight was taken on a weighing scale with standard minimum clothing to the nearest 0.5 kg. Body mass index (BMI) was computed as the ratio of weight (kg)/height (m^2). In addition, the students were classified based on the index range as underweight (less than 18.5), normal (18.5 to 25), overweight (26 to 30) and fat (31 and more). Flexible tape was used to measure waist and hip circumferences in centimeter. Waist to hip ratio (WHR) was calculated by dividing the waist to hip circumference. Waist circumference (WC) was measured in the highest point of iliac crest at the level of umbilicus and hip circumference (HC) at the fullest point around the buttocks ([6]). The exclusion criteria included the male students and age ranges from 18 - 20 years. The data were analyzed using one-way ANOVA and Pearson correlation test with a significance level of P $\leq$ 0.05.

3. Results

The result of analysis indicated that the mean age of students upon admission to the university was 19 years. The result indicated that only 16 (34.4 percent) of the admitted students had normal weight while 26 (51 percent)

were overweight and 8 (15.7 percent) were in fat category. In addition, 18 (35.3 percent) were in age 18 group, 15 (29.4 percent) in age 19 and 18 (35.3 percent) were in age 20 group.

In Table 1, descriptive statistics for demographic data is presented for age (year), height (cm), weight (kg), waist and hip circumference (cm), weight to hip ratio (WHR) and BMI (kg/m^2).

Kolmogorov-Smirinov test result indicated that the variables had normal distribution and therefore parametric statistical tests were employed to perform statistical test. These results are presented in Table 2.

Pearson correlation test was used to determine if there was any relation between the anthropometric variables in these students. The result of this analysis is presented in Table 3. An inspection of the Table reveals that there was a significant positive association between the weight and height, waist and hip size, WHR and BMI (P = 0.001), whereas there was no association between the height with BMI and WHR (P > 0.05).

Further analysis was performed on data by comparing the mean values of anthropometric measure of the age group 18, 19 and 20 years old students. The result of this analysis is presented in Table 4. The result of analysis indicated that there was a significant difference between the BMI of the three age group (P = 0.037). These results are presented in Table 4. Further analysis indicated that there was only a significant difference between the BMI of the age group 18 compared to the 19 and 20 years old (respectively, P = 0.02, P = 0.03) and no significant differences was found between the age group 19 and 20 years old (P > 0.05).

4. Discussion and Conclusion

This study was designed to examine the anthropometric measures of newly admitted medical students to the college of medicine. The aim of the study was to determine the anthropometric measures, specifically, body mass index that is used as an index of obesity in the health and medical literature. Overweight and obesity conditions are health risk factors that is of great concern at early ages. The result of study indicated that more than 74 percent of the medical students entering the college of medicine were either overweight or obese. These individuals will be in charge of treating the public once they graduate from medical school, but their own health is at risk in the early years of college entrance. The interesting findings were that BMI of the age group 18 was significantly more than the 19 and 20 years old students. This result indicates that the medical students during the high school periods are more at risk of being overweight or obese than the students who enter the college one or two years after their graduation from high school. Such assumption

Table 1. Descriptive Statistics of Demographic Data; Age (Year), Height (cm), Weight (kg), Waist and Hip Circumference (cm), WHR and BMI (kg/m^2)

Variables Statistics	Age	Height, cm	Weight, kg	Waist, cm	Hip, cm	HR, bpm	WHR	BMI, kg^2
Mean	19	179.94	86.25	91.84	110.17	80.49	0.83	26.5
Std. deviation	0.84	7.56	18.41	15.36	14.36	12.32	.051	4.87
Minimum	18	168	45	60	72	65	0.75	14.69
Maximum	20	204	128	123	140	110	0.92	35.59

Abbreviation: HR, Heart Rate.

Table 2. Kolmogorov-Smirinov test for Height (cm), Weight (kg), Waist and Hip Circumference (cm), Weight to Hip Ratio and BMI (kg^2)

Variables	Height, cm	Weight, kg	Waist, cm	Hip, cm	HR, bpm	BMI, kg/m^2	WHR
P value	0.067	0.61	0.53	0.36	0.051	0.28	0.58

Table 3. Correlation Matrix of Height (cm), Weight (kg), Waist and Hip Circumference (cm), Weight to Hip Ratio and bmi (kg^2)

Variables	Height, cm	Weight, kg	Waist, cm	Hip, cm	WHR	BMI, kg/m^2
Height, cm	1	0.531**, 0.001	0.351*, 0.012	0.375**, 0.007	0.132, 0.357	0.122, 0.393
Weight, kg		1	0.902**, 0.001	0.804**, 0.001	0.728**, 0.001	0.903**, 0.001
Waist, cm			1	0.938**, 0.000	0.705**, 0.001	0.873**, 0.001
Hip, cm				1	0.420**, 0.002	0.753**, 0.001
W/hip					1	0.776**, 0.001
Bmi, kg^2						1

is based on the fact that under normal circumstance, the high school students who are well qualified to enter the college of medicine are less active physically and spend most of their time on studying and gain more weight (14-16) compared to those who do not succeed to enter the college of medicine immediately after high school graduation compared to the 19 or 20 years old student who presumably have more time to be physically active and probably engage in physical activity. However, there was no significant difference between the other anthropometrics indices of these age groups. In regard to the height, it is conceivable that boys' height growth peaks at age 17 or at most in 18 years of age. Therefore, no difference in height measure is expected. In addition, waist and hip circumferences probably change together to some point in such a way the ratio does not exceed markedly. This condition is not the case for the BMI ratio. For this ratio calculation, height is a parameter that remains fixed at the age 18, but the weight increases and it results in higher ratio for BMI. This is indeed the case for the BMI ratio for these students. It is also fortunate for the students who are overweight or fat since they may alter a health risk factor such as over weightiness or obesity. By participating in physical activity or adopt-

ing a healthy diet, they can reduce their weight and bring their BMI to a desirable level. The result of Pearson correlation analysis showed the positive association of weight with other indexes of waist, hip sizes, WHR and BMI. These findings indicate that as the weight increases so does the waist, hip sizes, WHR and BMI.

The findings of the present research are not comparable to many studies that have been conducted to examine the weight gain during the freshman years or later on, but confirm the findings of many studies that show 35 percent of the individuals between the age 12 to 19 are obese (12). However, the result of the present research is similar to the finding of Sayyah et al. (13) who examined the newly female students admitted to university. In that study, despite the different pattern of BMI for the age groups 18 to 21, about 14 percent of the female students admitted to university were overweight or fat. Based on the result of this study, it was concluded that a large proportion of newly admitted male students to the college of medicine were overweight or fat. All in all, one of main limitation of the research is that it is not clear what proportion of these students gain more weight after admission to the college, so a large number of subjects with different age groups and disciplines at uni-

Table 4. Analysis of Variance Table for Comparing Height (cm), Weight (kg), Waist and Hip Circumference (cm), WHR and BMI (kg/m^2) of the Age Groups

Variables	Sum of Squares	df	Mean Square	F	Sig.
Height				1.304	0.281
Between groups	147.479	2	73.740		
Within groups	2715.344	48	56.570		
Total	2862.824	50			
Weight				1.559	0.221
Between groups	1034.342	2	517.171		
Within groups	15925.344	48	331.778		
Total	16959.686	50			
Waist				2.407	0.101
Between groups	1075.901	2	537.950		
Within groups	10726.844	48	223.476		
Total	11802.745	50			
Hip				1.764	0.182
Between groups	706.256	2	353.128		
Within groups	9611.156	48	200.232		
Total	10317.412	50			
WHR				1.916	0.158
Between groups	0.010	2	0.005		
Within groups	0.124	48	0.003		
Total	0.134	50			
BMI				3.544	0.037
Between groups	153.176	2	76.588		
Within groups	1037.193	48	21.608		
Total	1190.369	50			

versities are needed in future studies.

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