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The Prevalence of Underweight, Overweight, Obesity and the Influence of Exercise and Diet on Body Weight among Medical Students

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Abstract

Title: A cross sectional study to determine the prevalence of various weight groups among medical students and to correlate the effects of exercise and diets on the prevalence of various weight groups.

Background: Weight disorders can have an effect on the health status or general well-being of a person. Various health problems have been linked with weight disorders. Those who are underweight have an increased risk of anaemia, heart irregularities or possible disorders of malnutrition, whereas those who are overweight or obese have an increased risk of coronary heart disease or type 2 diabetes.

Methods and Findings: A descriptive cross sectional design was used. The study was conducted at the Simulation lab of All Saints University School of medicine, Dominica. A total number of 100 students (subjects) from PM1 to MD5 were randomly selected to participate in the study within the age range of 15-29. Standard procedures were used to determine the height and weight and the BMI was calculated from the results of the measurements of weight (kg) and height (m) (kg/m^2). Questionnaires were also distributed to get additional information about their exercise frequency and major diet content. The result of the study shows a high prevalence of normal weight individuals among the students which was followed by the overweight individuals. It also showed that a large percentage of the students more than average do not engage in any form of exercise and this can lead to high body weight prevalence. The consumption of carbohydrate diet was also high among the students contributing to the high prevalence of high body weight groups among the student.

Conclusion: The effects of lack of exercise coupled with high carbohydrates diet was established as contributing to

the high prevalence of overweight and obesity among the student.

Keywords: BMI (Body mass index); Exercise; Diet; Overweight and obesity; All Saints University School of Medicine; Coronary heart disease; Type 2 diabetes

Introduction

Weight disorders have been a subject of concern to most health practitioners over the years as this can affect the overall wellbeing of a person. Various fluctuations in the weight of individuals have known to occur due to an imbalance between energy input and energy output or due to various metabolic disorders. Sedentary lifestyles and excess calorie intake contribute to overweight and obesity, and the period between adolescence and early adulthood is accompanied by lifestyle changes that predispose young adults to become less physically active [1]. The 1995 College Health Risk Behavior Survey [2] indicates that dietary and activity patterns of many college students predispose them to future health problems.

Weight disorders are responsible for a number of health problems some of which include; for underweight: increased risk of anemia [3], osteoporosis [4], 'in women it can lead to amenorrhea [5], and for overweight or obesity: type II diabetes [6], coronary heart disease [7], high blood pressure (hypertension) [8], High cholesterol level (dyslipidemia) [9]. Some causes of being underweight could be as a result of loss of appetite, difficulty chewing or reduced appetite. In other cases especially in the case of malnutrition it is considered a health problem because it can lead to some health diseases mentioned above. Being overweight and obesity are both defined as the abnormal pile of fat that can weaken the health of an individual. This occurs when the energy ingested exceed the energy expenditure over a prolonged period of time.

The prevalence of obesity worldwide has doubled between 1980 and 2014. In 2014, more than 1.9 billion adults aged 18 yrs and above were overweight. Of this number over 600 million were obese. Overall, about 13% of the world's adult population (11% of men and 15% of women) was obese in 2014. In 2014, 39% of adults aged 18 years and over (38% of men and 40% of women) were overweight (WHO, 'World Health Organization') [10]. The weight of a person can have an overall effect on the various aspects of the life of each individual. The importance of body weight has been seen in the cognitive performance of children in the research done by Hjorth et al. [11], it was found that normal weight children had higher cognitive performance compared to overweight/obese as well as underweight children, independent of multiple lifestyle indicators. The effect of body weight on emotion was studied by Kohlmann and Weidner [12] and they reported that increased body weight was also related to anger traits and an anger-out expression style, but only among men.

The most preferred and widely used method to determine underweight, normal weight, overweight and obesity in a person is by calculating the body mass index (BMI) of the individual.

Materials and Methods

A cross-sectional study was carried out amongst the students of All Saints University School of Medicine (Commonwealth of Dominica). A total number of a hundred students willingly participated in the study in which an average of 12 students from each class (PM1-MD5).

Necessary permission was acquired from the school management and also from the students who participated in

the study. After gathering the students to commence the research, the research questionnaire was distributed to each of the participants to obtain information about their regular diet and exercise level before their body mass index (BMI) was measured.

The test was carried out in the simulation lab of All Saints University School of Medicine. The height (m) and weight (kg) of all the study participants were measured using the different instruments (for height measurement a stadiometer was used and for weight measurement a weighing scale was used) to determine the body mass index of each participant. After the measurements, the results of the measurements are then calculated using this formula (kg/m^2) to calculate the BMI of the participants. BMI lesser than or equal to $18.6 \text{ kg}/\text{m}^2$ is considered underweight, BMI between ($18.7 \text{ kg}/\text{m}^2$ - $24.9 \text{ kg}/\text{m}^2$) is considered normal weight BMI between ($25 \text{ kg}/\text{m}^2$ - $29.9 \text{ kg}/\text{m}^2$) is considered as overweight and BMI greater than or equal to $30 \text{ kg}/\text{m}^2$ is considered obesity [13].

This research was done conveniently within a period of three weeks, mobilization and collection of materials was done in the first week, the data were collected within the second week and the data were analyzed using STATA within the third week.

Results

A total of 100 students participated in the study. 49 were between the ages of 15-19, 40 were between 20 and 24 and 11 were between 25% and 29.7% were found to be underweight, 52% were normal weight, 28% were overweight and 13% were obese (**Table 1**).

Table 1 Age groups in relation to BMI, exercise and food content.

Age group	Body Mass Index	Exercise	Food	Total Number
15-19	UW-6.12%	Yes-34.69%	Carbohydrate-79.59%	49
	NW-63.27%	No- 65.31%	Protein- 20.41%	
	OW-22.45%			
	OB-8.16%			
20-24	UW-10%	Yes-47.50%	Carbohydrate-72.5%	40
	NW-42.5%	No- 52.50%	Protein-27.5%	
	OW-27.5%			
	OB-20%			
25-29	UW-0%	Yes-90.91%	Carbohydrate-72.73%	11
	NW-36.36%	No-9.09%	Protein-27.27%	
	OW-54.55%			
	OB-9.09%			
				100

UW: Underweight, OW: Overweight, NW: Normal Weight, OB: Obese

Fat was not indicated as the major content of the diet of any of the participants. 76% indicated carbohydrate as their major diet content and 24% chose protein. 46% admitted that they exercise and 54% admitted that they do not exercise. The majority of students across all age groups picked carbohydrate as their major food content and the remaining indicated protein as their major food content (**Table 2**).

Table 2 BMI (Body mass index) in relation to food content.

BMI	Carbohydrate	Protein	Total
Underweight	3 (42.86%)	4 (57.14%)	7
Normal weight	41 (78.55%)	11 (21.15%)	52
Overweight	22 (78.57%)	6 (21.43%)	28
Obese	10 (76.92%)	3 (23.08%)	13
Total	76	24	100

For those who were underweight, 57% indicated a protein diet, compared to roughly 20% in the other weight ranges. The major food content for those who are normal weight, overweight and obese was carbohydrate at more than 75%. Interestingly, for those who were underweight and normal weight more than 57% indicated that they do not exercise (**Table 3**). For those who were overweight and obese those who did not exercise were slightly less at 42.86% and 53.85% respectively, and those who exercised were slightly more at 57.14% and 46.15% respectively (**Table 4**).

Table 3 BMI (Body mass index) in relation to exercise.

BMI	Exercise	Do not Exercise	Total
Underweight	3 (42.86%)	4 (57.14%)	7
Normal weight	21 (40.38%)	31 (59.62%)	52
Overweight	16 (57.14%)	12 (42.86%)	28
Obese	6 (46.15%)	7 (53.85%)	13
Total	46	54	100

Table 4 Food content in relation to exercise.

Food	Exercise	Do not Exercise	Total
Carbohydrate	43 (43.42%)	43 (56.58%)	76
Protein	13 (54.17%)	11 (45.83%)	24
Total	46	54	100

In relating food content and exercise habit, a higher percentage of students who have a protein diet also exercise (54.17%) compared to 43.42% of those who consume carbohydrate mainly.

Whereas of those who have a carbohydrate diet, a higher percentage 56.58% do not exercise, compared to 45.83% of those who take a protein diet.

Discussion

Results of the study showed that among the students the normal weight (52%) has the highest prevalence followed by the overweight (28%) with the underweight (7%) being the lowest; this clearly shows a tendency towards a high weight disorder among medical students rather than towards the low weight disorders. The results from this research also correlate with two main researches carried out in two medical schools in India. The first research carried out in Medinipur, India where total prevalence of obesity was 3.4%, overweight was 17.5% and normal weight with the underweight was about 79% [14], the second research was done in Delhi, India also reported a prevalence of overweight with 11.7% and 2% obesity among the medical students [15].

The research result also showed that 46% of the students engaged in any form of exercise while 54% of the total students do not engage in any form of exercise. Therefore this research has shown that lack of exercise among medical student can lead to a high percentage of high body weight disorders. Previous work done by Stiegler et al. [16] showed that lack of exercise can cause an increase in body weight and the research work also done by Cris et al. [17] confirmed that higher amount of activity is necessary for the maintenance of body weight.

The research results showed that about 76% of the medical students are on diet that has carbohydrate as the main component while only 24% are on diet that has protein as the major component. When these diets were compared within the various body weight groups, only the underweight group has a diet with higher amount of protein compared to carbohydrate. This research therefore also confirms that a diet that contains a considerably high amount of carbohydrates is necessary for the maintenance of body weight. Previous researches also done has shown that high intake of carbohydrates can lead to increase in body weight if this is not balance with high level of energy expenditure [18]. The research also conducted by Gaesser [19] also confirmed that the prevalence of overweight and obesity is due to high carbohydrate intake.

The study sample was relatively small and a larger sample would have been more representative of the diet and exercise habits of students as well as their respective body mass indexes. The focus of our research was narrowed to food content and exercise and perhaps limited the study. A broader focus integrating other factors that could affect weight and general wellbeing would help improve the study.

Recommendation and Conclusion

In this study we concluded that the type of diet and exercise play a significant role on the prevalence of various weight groups among medical students. Most students who do not

exercise and eat a diet rich in carbohydrates have high weight prevalence while most low weight students are on protein diet. We recommend that future research be done using a larger study sample size. Various relationships can also be observed or built upon such as the relationship between high protein diet and low body weight, how diet and exercise affect academic performance and overall wellbeing of students and the influence of stress on weight and wellbeing. Delving deeper into the contents of diet and exercise frequency and intensity would give a richer result but analysis may be more tasking. We also recommend that the school authorities should promote proper eating habit and regular exercise among medical students as this will enhance their general performance.

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