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Annals of Biological Research, 2011, 2 (6):130-134
(http://scholarsresearchlibrary.com/archive.html)

Annals of Biological Research
Scholars Research Library
ISSN 0976-1233
CODEN (USA): ABRNBW

The Relationship between Body Mass Index and Cardiovascular Risk Factors in Inactive Male Students

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ABSTRACT

Previous research studies have well argued that obesity and cardiovascular diseases are the main reasons for fatality indifferent societies. The purpose of the present research was to determine the relationship between body mass index and cardiovascular risk factors in inactive male students. Thus, 80 students were randomly chosen from the students of Islamic Azad University, Abhar Branch (Iran) and were studied. The BMI of subjects were recorded and the factors that were presumed to be the chief cardiovascular risk factors were measured. For data analysis, descriptive statistics and Pearson's correlation coefficient were applied at the 0.05 significance level and in SPSS 16 software. The results showed that there is no significant relationship between BMI and any of the cardiovascular risk factors ($P > 0.05$). Considering research findings, we can say that there are factors other than obesity and overweight that affect the prevalence of cardiovascular diseases and they lead to most of fatalities. Further research is thus recommended to investigate the relationship between cardiovascular risk factors and other possible factors to identify the factors associated with cardiovascular diseases. Hence, a fundamental step can be taken to prevent fatality due to cardiovascular diseases and to enhance the health-related quality of life.

Keywords: Cardiovascular risk factors, Body mass index, Inactive men, Obesity.

INTRODUCTION

Obesity is one of the prevalent diseases in the contemporary world and it is estimated that around 1.2 billion people of the world's population are overweight [1].Studies carried out in Iran also show that obesity has increased over the recent years and it is expected to grow due to the increase in urbanization [2]. Increase in weight will jeopardize health in the long run and is associated with heart disease, type 2 diabetes, heart attack, osteoporosis, sleeping disorders, and

some types of cancer [3].On the other hand, cardiovascular diseases (CVD) are among the main reasons for fatality throughout the world as 17 million people lose their lives because of these diseases each year [4].International research has reported that availability of delectable, high-energy foods and drinks as well as the increase in their variety has increased the energy intake and has led to a positive energy balance and consequently to the prevalence of obesity and overweight. Obesity and overweight can be measured using BMI and WHR [5]. Thus, if BMI is above 25, the person is overweight and if it is below 30, the person is obese [6]. Many mechanisms contribute to cardiovascular diseases and each of these mechanisms has specific risk factors; if any of these risk factors exceed the normal range, the possibility of cardiovascular diseases increases. Some of these risk factors include total cholesterol, triglyceride, fibrinogen, HDL, LDL, Apo A/Apo B ratio, systolic and diastolic blood pressures, and waist-hip ratio. studied the relationship between obesity and cardiovascular risk factors in 20-70 years individuals in Tehran and came to the conclusion that the prevalence of obesity is 15% in men and 30% in women. Overall, the prevalence of obesity and overweight in the studied population was 63% and an increasing trend of this disease was observed in comparison with previous statistics. Moreover, the prevalence of high blood pressure was 20% in men and 23% in women and the level of prevalence increased with age in both groups. In this research, 50% of men had hypercholesterolemia and hypertriglyceridemia, but the prevalence of these disorders in women was 55 and 42 percent respectively. 49% of men and 51% of women had high LDL and 63% of men and 36% of women had low HDL. They concluded that in Iran – like other countries – obesity is followed by the increase of cardiovascular risk factors [2]. Jeremy Button and colleagues studied the level of cardiac risk factors and its relationship with overweight and fat distribution in children and came to the conclusion that high level of triglyceride and insulin and low level of high-density lipoprotein is associated with obesity. When this relationship was examined in overweight children, they concluded that these children also had high level of triglyceride and low levels of lipoprotein in comparison with normal children [7]. Fabian et al. (2005) studied BMI and WHR and their relationship with cardiac risk factors and came to the conclusion that there was a very high prevalence of obesity and overweight in the women of the population of interest. Abdominal obesity was observed in 74% of women and 46.1% of men. Mean BMI, body fat, total cholesterol, HDL, and triglyceride were significantly higher in men than women and most of the relationships were between anthropometric indices and cardiovascular risk factors. Moreover, it was observed that the increase of BMI and abdominal fat increases the level of triglyceride and blood pressure and decrease HDL. Metabolic syndrome was generally higher in obese and overweight subjects [8]. Ortlepp et al. (2003) studied the relationship between BMI and physical activity and cardiovascular risk factors in 18-23 years old individuals with normal weight and desirable lifestyle (no smoking, no excessive consumption of alcoholic drinks, etc.) and they came to the conclusion that those with BMI below 25 and with 3 hours of physical activity each week had lower blood pressure and harmful blood lipids [9]. Sadrbafqi et al. (1382) investigated the prevalence of abdominal obesity and its relationship with other cardiovascular risk factors in Yazd Province came to the conclusion that the prevalence of overweight (BMI between 20 and 30) was 35.7% and that of obesity was 16.38%, and that BMI and abdominal obesity had a significant relationship with the mean levels of cholesterol, TG, and LDL. In this study, the prevalence of hyperlipidemia, blood pressure, and diabetes mellitus was significantly higher in obese people as compared to normal people, and as well obesity and abdominal obesity had a significant inverse relationship with smoking and education level [10]. According to the research studies carried out in this regard, there is a strong relationship between

body mass index and cardiovascular risk factors, but this relationship is different in different age levels. Further, in most of the studies carried out in and out of Iran, this relationship is mainly examined in childhood or adulthood and largely on obese individuals. Thus, the purpose of the present research is to investigate the relationship between body mass index and cardiovascular risk factors in overweigh youths.

MATERIALS AND METHODS

The present research is descriptive-correlation. To carry out the research, 80 students were randomly chosen from the students of Islamic Azad University, Abhar Branch and were studied. The body mass index of all the subjects was recorded and factors that were likely to be the chief cardiovascular risk factors were measured. The height and weight of the subjects were measured as follows:

Subjects stood against a flat wall while measuring the height without any footwear and socks and they were asked to touch the wall with their heel, protrusion of gastrocnemius, shoulder, and occipital area and to maintain their stretched posture while looking straight. In this state, the height of the subjects was recorded in centimeters using a tape measure.

During weighting, the subjects wore minimum clothes and weighting was done at least two hours after they took their last meal. The BMI of subjects – as an index of body composition – was calculated by dividing their weight in kilograms by the square of their height in centimeters.

Cardiovascular risk factors such as LDL, HDL, TG, total cholesterol, and fibrinogen were measured by a phlebotomist in the laboratory of the University of Medical Sciences, where 10 cc of blood was taken from the anterior cubital vein of subjects' left hand. Blood sampling was done at 8 to 9 A.M., so that the subjects would have gone 12 hours without food. The temperature of the blood sampling room was 23 degrees centigrade in both pretest and posttest levels. The blood samples were divided into serum and plasma. Plasma was used in order to measure fibrinogen levels. Serum was also divided into two parts; one part was used for measuring HDL and the other for measuring LDL. Kits made by Kyoma Co. were used for measuring HDL and LDL which was done using Beckman Spectrophotometer. Fibrinogen was measured based on one-step coagulation using Sigma Diagnostics kits. The spectrophotometer method was used for measuring TG and total cholesterol. To measure blood pressure, first the subject sat on a seat for 20 minutes until their heart rate reached the resting heart rate. Then using a Japan-made piezometer, systolic and diastolic pressures were measured (in mmHg).Descriptive statistics and Pearson's correlation coefficient was applied for data analysis at the 0.05 significance level in SPSS 16 software.

RESULTS

The personal characteristics of subjects including age, height, weight, and BMI are presented in table 1.

Table 1 – Personal characteristics of subjects

Indices	Means	Standard Deviation
Age	22.57	2.50
Weight	85.08	5.30
Height	176.62	4.09
BMI	27.46	1.23

The measured mean of the blood factors including total cholesterol, low-density lipoprotein, high-density lipoprotein, triglyceride, fibrinogen, systolic blood pressure, and diastolic blood pressure are presented in table 2.

Table 2 – Descriptive indices of blood factors

Blood Factors	Total Cholesterol mg/dl	Low-density Lipoprotein mg/dl	High-Density Lipoprotein mg/dl	Triglyceride mg/dl	Fibrinogen mg/dl	Systolic Blood Pressure mmHg	Diastolic Blood Pressure mmHg
Mean	179.82	102.39	45.46	140.94	218.92	128.92	81.36
SD	27.34	19.25	7.60	52.48	21.04	6.74	9.92

Using Pearson's correlation coefficient not showed any significant relationship between BMI and any of the cardiovascular risk factors ($P > 0.05$). There was an inverse relationship between BMI and high-density lipoprotein and its relationship with other factors was direct, but it was not significant in any of the yielded results (table 3).

Table 3 – The relationship between body mass index (BMI) and the blood factors of subjects

Body Mass Index (BMI)	Total Cholesterol	Low-density Lipoprotein	High-Density Lipoprotein	Triglyceride	Fibrinogen	Systolic Blood Pressure	Diastolic Blood Pressure
Correlation	0.065	0.061	-0.98	0.110	0.118	0.214	0.203
Significance	0.0660	0.872	0.681	0.724	0.675	0.514	0.460

DISCUSSION AND CONCLUSION

The aim of this study was to determine the relationship between body mass index and cardiovascular risk factors in inactive male students. Using Pearson's correlation coefficient not showed any significant relationship between BMI and any of the cardiovascular risk factors. ATP III criteria define hypercholesterolemia as TC≥200mg/dl, hyperglyceridemia as TC≥200mg/dl, and lipoprotein as subclass [2]. Moreover, the desirable systolic blood pressure for adults is 120 mmHg and the desired diastolic blood pressure for adults is 80 mmHg. Comparing the obtained means and ATP III criteria reveals that all the measured blood factors were at a normal level except for triglyceride which was in the borderline-risk range. Furthermore, the obtained means for systolic and diastolic blood pressures were above the desirable level and no significant relationship was observed between BMI and any of these factors, which is inconsistent with the findings of many research studies [2, 7, & 10]. A possible reason for the lack of consistency between these findings could be due to the difference in the type of previous research in comparison with the present research; in most of the previous studies, the relationship between BMI and obesity/overweight were simultaneously analyzed and it appears that the results from obese subjects have affected the results from overweight subjects. Cardiovascular diseases are associated with the person's lifestyle, habits, hygiene behaviors, and

congenital factors and are as a whole referred to as risk factors [12]. Risk factors are generally divided into controllable and uncontrollable. Factors such as age, gender, family history, etc. are uncontrollable factors and inactivity, smoking, stress, obesity, etc. are controllable ones [13]. Although obesity is not the only cardiac risk factor, it is a critical factor in cardiovascular diseases, in particular heart infarction. Obesity is associated with the increase of the level of plasma leptin [13]. Perhaps one of the ways of illustrating the importance of movement is to discuss motor system disorders. Motor system disorders are those associated to inactive lifestyles. What is meant by it is the low level of physical activity? With the advancement of technologies, motor behaviors required for fulfilling everyday needs have decreased. This lack of activity can deteriorate many of the natural body processes; thus, decrease in physical activity can directly or indirectly lead to some diseases such as obesity, high blood pressure, coronary thrombosis, diabetes, etc. [13]. Although the relationship between obesity and these factors are well-established, more research has to be done on overweight subjects to reveal the level of these factors in these people, so that preventive strategies will be developed and presented based on the results. Considering the results of the present research, although no relationship was observed between cardiovascular risk factors in overweight subjects, it is perfectly clear that overweight is the gateway to obesity and with their current inactive lifestyles, these subjects are prone to the increase of these risk factors. It seems that a step can be taken toward preventing cardiac diseases and the difficulties resulting from them by measuring body mass index, being aware of the level of extra weight, and achieving ideal weight through physical activity.

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