Study on the Relation Between BMI and Degree of Coronary Artery Obstruction

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Abstract: Obesity is introduced as a known risk factor of coronary artery disease (CAD) by the American heart association. BMI is an index used for the evaluation of body weight. Despite presence of the relationship between BMI and occurrence of coronary artery disease, yet, no relationship has been found between the degrees of coronary artery obstruction and BMI which is the main issue of this research. In order to determine body mass index at different stages of coronary artery obstruction, this study was done in descriptive method on 215 patients referring to angiography unit of Imam Khomeini hospital and BMI was measured at different stages of coronary artery obstruction. Questionnaire containing questions on demographic features and risk factors of coronary artery disease was filled. The obtained data were analyzed using SPSS software and descriptive analysis tests. Of 215 patients under study, mean age of 55 years (83 men and 132 women), all of them suffered from coronary artery problem ranging from one vessel to complete obstruction. Severity of coronary artery obstruction and the number of vessels involved had direct relationship with the increase in the rate of BMI. There was significant relationship between degree of BMI and observation of severity in obstruction during angiography (p<0.005).

Key words: BMI, coronary artery obstruction, obesity

INTRODUCTION

Coronary artery disease is one of the main non contagious factors causing morbidity and mortality in the USA and industrial countries, which led to death of more than one million American in 1998. Interesting point is that it causes sudden death in 50% of men and 62% of women (Jan *et al.*, 2000; WHO, 1998). Since, this problem has certain predisposing factors such as: old age, family history, immobility, diabetes, stress, smoking, hyperlipidemia, high LDL and obesity, therefore for education of prevalence rate and onset of coronary artery diseases, implement at of program aimed at reduction in predisposing factors is necessary. Different factors are involved in the pathogenesis of coronary artery disease and in most of the cases are due to atherosclerosis at the epicardium and all of them can be identified and diagnosed. Obesity is one of them. Obesity is known as one of the common metabolic disorders in man which has significantly increased in the last 2 decades. It is known as a risk factor for coronary artery disease by the American association of cardiology in 1988, it is a chronic disease and epidemic in the industrial countries due to change of life style (Haynrish, 1981). Lack of success in prevention and treatment of obesity and its effect on the onset of coronary artery diseases particularly in youth,

made the dietitian and cardiologists to warn the patients (Kasper, 1981; Androni *et al.*, 1997). Body mass index (BMI) is used to evaluate the body weight of person. This is obtained through the ratio of weight in Kg, divided by the raise of height in meter. According to the last instruction recommended by the health ministry's center for management of diseases, different criteria of BMI are as follow: 18.5-24.9 normal, 25-29.9 over weight, 30-34.9 and 35-39.9 grade I and II obesity, respectively and 40 and above known as grade III obesity (Haynrish, 1981).

The main objective of this study along with determination of the relation between BMI and degree of obstruction is to stablish the ways by which the disease could be diagnosed and treated in time with the help of BMI.

MATERIALS AND METHODS

In this study, BMI at the different degrees of the coronary artery obstruction was done descriptively on the patients referring to the angiography center of Imam Khomeini hospital at Sari (Iran)for 6 months (Jan to Jun 2003). The cases under study consisted of all patients referred by the cardiologist to the angiography center and undergone standard angiography. Based on the degree of obstruction, they were divided in to different subgroups

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considering by the number of coronaries involved (designated as natural zero and 1, 2 and 3). Then BMI was measured based on the formula of body weight in kg, divided by raise of height in meter. According to the instructions given by the ministry of health and disease management center, obesity degree was evaluated as follow: BMI<18.5 for underweight, 18.5-24.9 normal weight, 25-29.9 over weight, 30-34.9 obesity grade I, 35-39.9 obesity grade II and above that as obesity grade III. Then the questionnaire comprising of questions about variables such as, age, sex, degree of coronary artery obstruction, site of obstruction, duration of cardiac problem and presence of predisposing factors, like diabetes, hyperlipidemia, smoking, profession, education previous cardiac problem, was filled. Collected data were analyzed by SPSS software using descriptive statistical analysis such as numerical and central indexes and distribution.

RESULTS AND DISCUSSION

This study was done to determine BMI at different degrees of coronary artery obstruction on 215 patients (83 male, 132 female) with mean age of 55 years at Imam Khomeni hospital in Sari Township in 2003. The results are given in the Table 1.

On the basic of age and level of education, 51% of the candidates under study were illiterate and about 55% un employed or housewife (Fig. 1). Total 23% were smoker, 75.2 of them had cardiac problem in the previous year, 47.5% had been hospitalized and the rest as outpatient. Concerning the predisposing factors 29.8% had diabetes, 31.6% hyperlipidemia. Mean systolic blood pressure was 119 mm Hg and Mean diastolic pressure 75 mm Hg. The Angiographic findings were as follow: of 215 patients under study 3 with BMI<18.5, all vessels were reported normal. Total 73 patients with 18.5>BMI<25, 38 were in normal condition, 32 had one artery obstructed, 3 with 2 arteries obstructed. Total 99 patients with 25>BMI<30, 23 had normal arteries, 39 with 1 artery obstructed 32 with 2 arteries involved and in 5 all arteries were obstructed. Twenty nine patients with 30>BMI>35; 2 with normal arteries; 3 with one obstructed artery; 8 with 2 obstructed arteries and 16 with all obstructed arteries were observed of 11 patients with BMI>35 under angiography, one with 2 obstructed arteries and 10 with all obstructed arteries were observed Table 1.

Considering the above findings, a significant relationship was observed between different degrees of BMI and severity of coronary artery obstruction in angiography (p<0.005).

This study showed that BMI can be predictor of coronary artery disease severity. Table 1 shows that there is significant relationship between BMI and coronary artery obstruction. Many studies have been done regarding the effect of weight on the onset of coronary artery diseases (Sharifi *et al.*, 1998; Larusa *et al.*, 1998) but on the mechanism of this relationship and linear correlation between BMI as an exact index of over weight and severity of coronary artery disease less studies been done. The result of study done on elderly of Yasoj city corresponded with the findings of this study. Finding of a relevant study from Rasht city of Iran on 2000 acute cardiac infarcted patients were similar to our study (Pazoki, 2004). Also, it should be noted that in the above mentioned studies non invasive techniques were used for comparison and in our study coronary angiography as a gold standard was used. But in two other studies published in Circulation 1999 and JAMA 2004, BMI was not consider a proper index for determination of severity of coronary artery obstruction (Larusa *et al.*, 1998; Amy *et al.*, 2004). In fact the effect of BMI on the onset and severity of coronary obstruction can be studied on two aspects:

- The direct effect on weight gain and BMI as a risk factor on the onset of coronary artery disease.
- The indirect effect on weight gain as a predisposing for the other risk factors such as diabetes mellitus type II and hyperlipidemia.
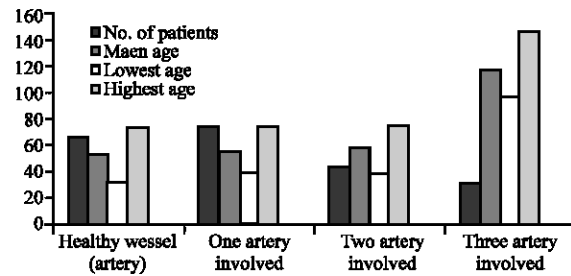

Fig. 1: Frequency distribution of individuals under study based on age

Table 1: Partial frequency distribution in severity of obstruction in the patients with different degree of BMI

BMI	Normal vessel(%)	Obstruction less than 50%	Obstruction between 50-75%	Obstruction above(%)	Mean(%)
18.5 <	4.50	-	-	-	1.40
Between 18.5-25	56.70	32.30	23.20	18.80	34
Between 25-30	35.80	58.1	40.60	60.40	46
Between 30-35	3	6.50	24.60	16.70	13.50
Above 35	-	3.20	11.50	4.20	5.20

Considering increasing number of diabetes type II and metabolic syndrome, particularly in the obese individuals in Iran, special attention should be paid to the importance of BMI in prevention of coronary artery disease (Weber *et al.*, 2001). In a study done on 906 female patients with mean age of 58 years, it was noted that BMI>25 had significant relationship with coronary artery disease and those with higher BMI along with abdominal obesity had higher degree of coronary artery obstruction (Wessel *et al.*, 2004). Finally, considering high e xpenses and out of reach of public to the techniques used for evaluation of degree of coronary obstruction (Angiography, Talium scan), BMI can be recognized as a cheap and easy index, or be implemented at least in isolation of high risk cases who are required to under go more expensive and more invasive techniques.

CONCLUSION

Considering the aim of this study and the main finding, which is presence of significant relationship between the degree and severity of coronary obstruction with BMI and since BMI is known as a coronary artery risk factor. BMI can be named as a predicting of for severity of obstruction though. Further study need to be done.

REFERENCES

Amy, R.W., D.S. Howard, I.M. Lee, R.C. Nancy, E.M. Joann, E.B. Julie and J.G. Michael, 2004. Relationship of physical activity vs body mass index with type 2 diabetes in women. JAMA., 292: 1188-1194.

Androni, T. *et al.*, 1997. Sissil Principles of Internal Medicine, Translated by Malekzadeh, R. and Associates, 2: 53-55.

Jan, A.G. *et al.*, 2000. Ebrahim off Samira and associates. Role of nutrition in prevention and control of diseases, 1: 2-30.

Kasper, H. 1981. A Persian translation by Taleban, A., forogh. Medical Nutrition and Diet Therapy, 2: 270-273.

Larusa, J.C. and T.A. Pearson, 1999. Cholesterol screening guidelins consensus/evidence from the department of commonsense circulation.

Pazoki, R., 2004. Study on the performed intervention related to reduction of predisposing cardiovascular risk factors in schools. www. Google. Com.

Sharifi, F. and F. Azizi, 1998. Study on prevalence of hyperlipidemia, over weight. J. Res. Med., 4: 41-50.

Wessel, T.R., C.B. Arant and M.B. Olson *et al.*, 2004. Relationship of physical fitness vs Body Mass Index with coronary artery disease and cardiovascular event in women. JAMA., 292: 1179-1187.

Weber, T., R. Berent and A. Kirchgatterer *et al.*, 2001. Coronary artery bypass graft dysfunction, clinical presentation, laboratory and electro-cardiographic parameters. ACTA Med. Aus., 28 (1): 5-10.

WHO, 1998. World Health Organization, statistics. Quaterly/vol/ub/No2.