

# Relation between BMI and Degree of Coronary Artery Obstruction

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## Abstract

**Background-** Obesity is introduced as a known risk factor of coronary artery disease (CAD) by the American Heart Association. Body mass index (BMI) is an index used for the evaluation of body weight. Despite the presence of the relationship between BMI and occurrence of coronary artery disease, no relationship has been found between the degree of coronary artery obstruction and BMI, which is the main issue of this research.

**Methods-** In order to determine BMI at different stages of coronary artery obstruction, this descriptive study was done on 215 patients referred to the angiography unit and BMI was measured at different stages of coronary artery obstruction. Questionnaires containing demographic features and risk factors of CAD were completed. The obtained data were analyzed using SPSS software and descriptive analysis tests.

**Results-** Of 215 patients under study with a mean age of 55 years (83 men and 132 women), all of them suffered from coronary artery problems ranging from one-vessel disease to complete obstruction. The severity of coronary artery obstructions and the number of vessels involved had a direct relationship with an increase in BMI. There was a significant relationship between the degree of BMI and observation of severity in obstruction during angiography ( $p < 0.005$ ).

**Conclusion-** Considering the aim of this study and the main finding, which is the presence of a significant relationship between the degree and severity of coronary obstruction with BMI and since BMI is known as a coronary artery disease risk factor, BMI can be named as a predictor of the severity of obstruction. Further studies are, however, required (*Iranian Heart Journal 2007; 8 (4): 53-56*).

**Key words:** body mass index ■ coronary artery obstruction ■ obesity

Coronary artery disease is one of the main non-contagious factors causing morbidity and mortality in the USA and industrial countries, which led to the death of more than one million Americans in 1998. An interesting point is that it causes sudden death in 50% of men and 62% of women.<sup>1-2</sup> Since this problem has certain predisposing factors such as old age, family history, immobility,

diabetes, stress, smoking, hyperlipidemia, high LDL and obesity, education and implementation of programs aimed at the reduction of predisposing factors is necessary. Different factors are involved in the pathogenesis of coronary artery disease, and most of the cases are due to atherosclerosis; all of them can be identified and diagnosed.

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Obesity is one of them, and is known as one of the common metabolic disorders in man which has significantly increased in frequency in the last two decades. Obesity has been known as a risk factor for coronary artery disease by the American Association of Cardiology in 1988; it is a chronic disease and is epidemic in industrial countries due to the change of lifestyle.<sup>2</sup> Lack of success in the prevention and treatment of obesity and its effect on the onset of coronary artery diseases, particularly in youth, have led dietitians and cardiologists to warn patients.<sup>3,4</sup> Body mass index (BMI) is used to evaluate the body weight of a person, and is obtained by the ratio of weight (kg) divided by the square of height (m).

### Methods

In this study, BMI was determined in 215 patients (83 male, 132 female) at a mean age of 55 years at different degrees of coronary artery obstruction among patients referring to the angiography center of Imam Khomeini Hospital, Sari over a 6-month period (Jan.-June, 2003). The cases under study consisted of all patients referred by the cardiologists to the angiography center to undergo standard angiography. Based on the degree of obstruction, they were divided into different subgroups based on the number of vessels involved (designated as normal zero, 1, 2 and 3). BMI was subsequently measured. According to the instructions given by the Ministry of Health and Disease Management Center, body status was evaluated as follows:

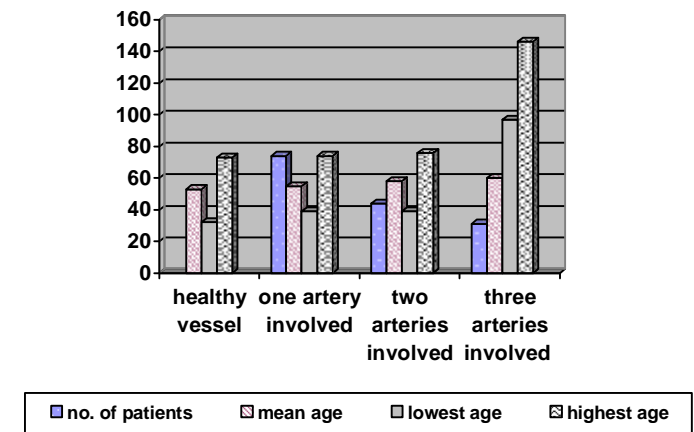
*BMI<18.5: underweight*  
*18.5-24.9: normal weight*  
*25-29.9: overweight*  
*30-34.9: obesity grade I*  
*35-39.9: obesity grade II*  
*>40: obesity grade III*

A questionnaire comprising 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, and previous cardiac problem, was filled out. Collected data were analyzed by SPSS software using descriptive statistical analysis such as numerical and central indexes and distribution.

### Results

The results are given in Figure 1.



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

On the basis of age and level of education, 51% of the candidates under study were illiterate, and about 55% were unemployed or housewives. Twenty-three percent were smokers, 75.2% of them had cardiac problems in the previous year, 47.5% had been hospitalized and the rest were outpatients. Concerning the predisposing factors, 29.8% had diabetes and 31.6% hyperlipidemia. Mean systolic blood pressure was 119 mm Hg, and mean diastolic pressure was 75 mmHg. The angiographic findings were as follows: of 215 patients under study, 3 with BMI<18.5, 73 with 18.5-25, 99 with 25-30, 29 with 30-35; 8 of 11 patients with BMI>35 under angiography, one with two obstructed arteries, and 10 with all obstructed arteries were observed. Table I shows the frequency of the

severity of CAD in the patients with different BMIs.

**Table I. Partial frequency distribution in severity of obstruction in the 215 patients with different BMIs.**

BMI	Normal vessel	Stenosis <50%	Stenosis 50-75%	Stenosis >75%	Mean
<18.5	4.5%	-	-	-	1.4%
18.5-25	56.7%	32.2 %	23.3 %	18.8%	34%
25-30	35.8%	58.1%	40.6%	60.3 %	46%
30-35	3%	6.5%	24.6%	16.7%	13.5%
>35	-	3.2%	11.5%	4.2%	5.1 %

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

### Discussion

This study showed that BMI can be a predictor of coronary artery disease severity. Table I shows that there is a 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<sup>7,8</sup> but on the mechanism of this relationship and linear correlation between BMI as an exact index of excess weight and severity of coronary artery disease, fewer studies have been carried out. The result of the study done on elders of Yasouj city corresponded with the findings of this study.<sup>9</sup> The findings of a relevant study from Rasht in 2000 acute cardiac infarction patients were similar to those of our study.<sup>10</sup> Also, it should be noted that in the above-mentioned studies, non-invasive techniques were used for comparison and in our study, coronary angiography was used as a gold standard. But in two other studies published in *Circulation* 1999 and *JAMA* 2004, BMI was not considered a proper index for the determination of severity of coronary artery obstruction.<sup>8,15</sup> In fact the effect of BMI on the onset and severity of coronary obstruction can be studied on two aspects:

A-the direct effect on weight gain and BMI as a risk factor on the onset of coronary artery disease,

B- The indirect effect on weight gain as a predisposer for other risk factors such as diabetes mellitus type II and hyperlipidemia.

Considering the increasing numbers of diabetes type II and metabolic syndrome, particularly in obese individuals in Iran, special attention should be paid to the importance of BMI in the prevention of coronary artery disease.<sup>17</sup> In a study done on 906 female patients at a mean age of 58 years, it was noted that BMI>25 had a significant relationship with coronary artery disease, and those with higher BMIs along with abdominal obesity had higher degrees of coronary artery obstruction.<sup>11</sup> Finally, given the high expenses and impracticality of advanced techniques for screening the degree of coronary obstruction (angiography, thallium scan), BMI can be regarded as an inexpensive and easy index.

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