

# Association of Body Mass Index with Risk Factors of Coronary Artery Disease

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## ABSTRACT

**Objective:** To evaluate the association of BMI and risk factors of coronary artery disease in patients presenting with chest pain in outdoor cardiology department.

**Study Design:** Descriptive / comparative study

**Place and Duration of Study:** This study was conducted at the Outdoor Cardiology Department of Nishtar Hospital Multan from May 2016 to August 2016.

**Materials and Methods:** All patients who presented with complain of chest pain in outdoor cardiology department were included. Patients were divided into three groups on the basis of BMI. SPSS V23 was used for data computation. Chi-square test and ANOVA test were used for comparison of variables between different BMI groups respectively.

**Results:** There were 42.0% females patients in obese group as compared to only 12.0% and 20.0% in normal weight and overweight groups (p-value 0.002). Mean age of patients at the time of presentation was significantly less in obese group  $49.38 \pm 6.56$  years, whereas in normal and overweight patients mean age was  $56.60 \pm 9.29$  years and  $54.84 \pm 9.94$  years respectively (p-value <0.001). There was no patient with age more than 60 years in obese group, 47.5% in overweight group and 52.5% in normal weight group (p-value <0.001). There were higher number of hypertensive patients in overweight (56%) and obese group patients (58%) as compared to normal weight patients (p-value 0.03). Coronary artery disease was diagnosed in only 20.0% patients in normal weight patients, 24.0% in overweight patients and in 48.0% obese patients (p-value 0.005).

**Conclusion:** Obesity is an independent risk factor for the early development of coronary artery disease (CAD) and increased risk of hypertension in early age.

**Key Words:** Obesity, Coronary artery disease, Body mass index.

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## INTRODUCTION

Obesity epidemic is a rapidly growing major public health issue worldwide. Obesity is also responsible for increased risk of many other health issues e.g. hypertension, diabetes mellitus, metabolic abnormalities and breathing disorders.<sup>1,2</sup> The prevalence of obesity is on the rise, there are 32% overweight and 34% obese in US.<sup>3</sup> In Pakistan, the reported prevalence of obesity is 52.2%.<sup>4</sup>

Obesity not only increases the risk of cardiovascular risk factors but also adverse cardiovascular events.<sup>5-7</sup> On the other hand, according to some studies an obesity paradox exists and obesity is responsible for better prognostic outcomes obese CAD patients as compared to lower BMI patients.<sup>8,9</sup>

Asian countries have a very higher prevalence of CAD.<sup>10-13</sup> CAD has been reported to be a major contributor of mortality in Pakistan as well as in the modern world.<sup>14-16</sup> Very few studies have focused on the association of BMI and cardiovascular risk factors. This study was done to evaluate the relationship of BMI with risk factors of CAD in patients presenting in outdoor patient cardiology department.

## MATERIALS AND METHODS

This descriptive comparative study was conducted in Nishtar Hospital Multan. All patients who present with complain of chest pain from May 2016 to August 2016 in outdoor cardiology department with suspicion of coronary artery disease having age > 30 years were included. Patients already diagnosed of having CAD were excluded. Ethical approval from institutional review board was taken. An informed consent were signed by all participants. Patients were divided into three groups on the basis of BMI. Patients with BMI < 25 kg/m<sup>2</sup> were categorized as normal weight, BMI 25-29.9 kg/m<sup>2</sup> overweight and  $\geq 30$  kg/m<sup>2</sup> as obese. Continuous consecutive sampling was used for data collection. Equal number of patients were selected for each group to make results of our study more reliable.

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History of risk factors of CAD was taken and further confirmed by diagnostic tests in the hospital. Electrocardiography and exercise tolerance test was used to confirm the presence of coronary artery disease. SPSS V23 was used for data computation. Chi-square test and ANOVA test were used to compare discrete and continuous variables between different BMI groups respectively.

## RESULTS

Out of one hundred and fifty patients, there were 50 patients in each group. There were higher number of female patients in obese group. There were 42.0% females patients in obese group as compared to only 12.0% and 20.0% in normal weight and overweight groups (p-value 0.002). Mean age of patients at the time

of presentation was significantly less in obese group  $49.38 \pm 6.56$  years, whereas in normal and overweight patients mean age was  $56.60 \pm 9.29$  years and  $54.84 \pm 9.94$  years respectively (p-value <0.001). There was no patient with age more than 60 years in obese group, 47.5% in overweight group and 52.5% in normal weight group (p-value <0.001).

There was no statistically significant in CAD risk factors between the groups except hypertension disease. There were higher number of hypertensive patients in overweight (56%) and obese group patients (58%) as compared to normal weight patients (p-value 0.03). In all patients who presented with chest discomfort, coronary artery disease was diagnosed in only 20.0% patients in normal weight patients, 24.0% in overweight patients and in 48.0% obese patients (p-value 0.005).

**Table No.1: Demographic Variables.**

Variable		Normal Weight	Overweight	Obese	P-value
Number of Patients		50	50	50	
BMI of Patients		23.36 $\pm$ 1.56	27.64 $\pm$ 1.46	33.37 $\pm$ 1.83	-----
Gender	Male	44 (88.0%)	40 (80.0%)	29 (58.0%)	0.002
	Female	6 (12.0%)	10 (20.0%)	21 (42.0%)	
Age		56.60 $\pm$ 9.29	54.84 $\pm$ 9.94	49.38 $\pm$ 6.56	<0.001
<b>Distribution of Age Groups</b>					
Age Group 30-49 Years		13 (25.0%)	16 (30.8%)	23 (44.2%)	<0.001
Age Group 50-60 Years		17 (29.3%)	14 (24.1%)	27 (46.6%)	
Age Group > 60 Years		21 (52.5%)	19 (47.5%)	0 (0.0%)	

**Table No.2: Comparison of CAD risk factors.**

Variable	Normal Weight	Overweight	Obese	P-value
Diabetes	12 (24.0%)	16 (32.0%)	19 (38.0%)	0.32
Hypertension	17 (34.0%)	28 (56.0%)	29 (58.0%)	0.03
Smoking	18 (36.0%)	19 (38.0%)	15 (30.0%)	0.68
Family History	13 (26.0%)	11 (22.0%)	12 (24.0%)	0.89
Hypercholesterolemia	2 (4.0%)	1 (2.0)	5 (10.0%)	0.18
CAD Diagnosed	10 (20.0%)	12 (24.0%)	24 (48.0%)	0.005

## DISCUSSION

Obesity has now become a well-known risk factor of CAD in general population and is linked with poor prognosis.<sup>17</sup> Modernization and sedentary life style are thought to be the major contributor of increased BMI. Due to which obesity is not becoming more prevalent in adults but also in children. The prevalence of CAD is also high in obese patients including adults and children. The management strategies to control obesity are still inadequate with unsatisfied results.<sup>18</sup> There is also a controversy regarding the relationship between CAD and obesity. Some studies have revealed a direct relationship between obesity and the risk of coronary artery disease and adverse events associated with it.<sup>5-7</sup> On the other hands, some studies have documented that severity of CAD is less severe in obese patients because body fat provide benefit of survival and hence against adverse effects of CAD.<sup>19-22</sup>

In this study, we examined the risk factors of CAD in patients who presented with chest discomfort in outpatient cardiology department with different body mass. We found higher proportion of hypertensive patients in obese and overweight patients. Husain et al. also found similar trend of hypertension in obese patients and normal weight patients.<sup>23</sup> These authors also found higher prevalence of diabetes in obese patients. In our study, there was no statistically difference of diabetes mellitus in groups, but the prevalence of diabetes was slightly higher in overweight and obese groups in comparison with normal weight subjects. In our study, there was higher proportion of females in obese (42.0%) and overweight patients (20.0%) as compared to normal weight patients (12.0%). Other studies have also found a significantly higher number of female with CAD in obese group of patients.<sup>3,23</sup> In our study, mean age was significantly less in overweight and obese patients as compared to

the normal weight patients. Hussain et al. found no significant difference in age between the obese and normal weight patients.<sup>23</sup> In some other studies, mean age was significantly less overweight and obese patients as compared to the normal weight patients.<sup>3,17</sup> Our study supported the results of these studies.

In our study, CAD was diagnosed in higher number of obese patients 48.0% patients as compared to 24.0% and 20.0% patients in overweight and normal weight patients. Hussain et al. found no significant difference in diagnosis of CAD between the obese and non-obese patients. In their study, 58.0% patients were diagnosed of having CAD in obese group and 42.0% in non-obese patients.<sup>23</sup>

In this study, we found that obese patients were presented in early age for chest complaints and most of these were suffering from coronary artery disease, hypertension history was also common in these patients.

## CONCLUSION

Obesity is an independent risk factor for the early development of coronary artery disease (CAD) and increased risk of hypertension in early age.

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**Conflict of Interest:** The study has no conflict of interest to declare by any author.

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