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FREQUENCY OF RISK FACTORS ASSOCIATED WITH CORONARY HEART DISEASE AMONG PATIENTS WITH HIGHER BODY MASS INDEX

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ABSTRACT

Objective: The aim of this study was to determine the frequency of risk factors associated with coronary heart disease (CHD) among patients with higher body mass index (BMI).

Methodology: This crosssectional study was conducted at Bahawal Victoria Hospital, Bahawalpur, from January 2011 to December 2013. All patients ⩾ 18 years of age, from both gender who attended cardiology clinic and gave consent, were included. Patients diagnosed with acute myocardial infarction within 3 months of starting the study, and those who had stroke, congestive cardiac failure or renal failure were excluded. Patients were categorized into three groups i,e. BMI <25(Normal), BMI 25- 29.9 (overweight) and BMI >30 (obesity). The risk factors associated with CHD were recorded. A descriptive analysis of the characteristics of patients overall was performed, and the characteristics of patients with BMI <25 and BMI >25 were compared. P-value < 0.05 were considered as statistically significant .

Results: A total number of 1492 patients were studied. Overall, 62.5% of patients were overweight/obese. The group of patients who had higher BMI (BMI>25) had more females(64%), more smokers(54%), more patients with diabetes mellitus (71.5%), hypertension (72%), ischemic heart disease (58%), hyperlipidemia(88%) and post-menopausal women (64%).

Conclusion: In conclusion, 62.5% of patients were overweight/obese. Diabetic and hypertensive patients had a higher prevalence of being overweight/obese, 71.5% and 72%, respectively. Age, gender, hyperlipidemia, diabetes mellitus, hypertension and BMI were found to be independently associated with the risk of developing CHD.

Key Words: Coronary Heart Disease, Obesity, BMI, Risk Factors

INTRODUCTION

Obesity is becoming an epidemic world-wide not only in adults, but also among children.[1] This condition is associated with numerous risk factors and comorbidities such as hypertension, metabolic syndrome, type 2 diabetes, cardiovascular disease, sleep apnea/sleep-disordered breathing and also with certain cancers.[1,2] Although BMI is the most common parameter used to study obesity, other parameters such as the waist circumference, used to assess abdominal obesity, are also used.[3] A study from Europe that comprised of nearly 360,000 patients reported that both general and abdominal obesity were risk factors for death.[4]

The prevalence of being overweight or obese is on the rise in the United States, nearly 70% of adults are now classified as having this condition, compared with <25% identified 40 years ago.[3,5] Moreover, the proportion of subjects with morbid obesity has also increased significantly.[3,6] The World Health Organization has estimated that >1 billion people are overweight worldwide.[7,8] In Pakistan, a community study carried out in the urban Karachi population reported that nearly 52.2% of the community was overweight/obese.[9]

Higher BMI not only worsens metabolic profile, but also increases the risk of cardiac diseases.[1] Heart may be affected by obesity through the increased prevalence of cardiovascular risk factors, such as hypertension, dyslipidemia, or glucose intolerance, but also due to the prothrombotic and inflammatory state that happens in this situation.[1,10,11] However, despite these adverse associations, numerous studies have reported an obesity paradox as obese patients with heart disease show a better prognosis compared to those with lower BMI.[7]

In the year 2000, cardiovascular diseases (CVD) accounted for 16.7 million deaths all over the world.[12] The developing countries are responsible for two thirds of CVD mortality.[13] South Asians are reported to have one of the highest rates of coronary heart disease (CHD).[14–17] A survey from Pakistan, the National Health Survey of Pakistan (NHSP), has reported that the mortality due to CHD is on the rise.[18]

Few studies from our part of the world have focused on the association of higher BMI and its association with CVD.The aim of this study was to determine the frequency of risk factors associated with coronary heart disease among patients with higher BMI.

METHODOLOGY

This cross-sectional study was conducted at Bahawal Victoria Hospital, a Tertiary Care Hospital in Bahawalpur, Punjab from January 2011 to December 2013. All patients ⩾ 18 years of age, from both gender who attended cardiology clinic and gave consent, were included. Patients diagnosed with acute myocardial infarction within 3 months of starting the study, and those who had stroke, congestive cardiac failure or renal failure were excluded. Patients were categorized into three groups i,e. BMI <25(Normal), BMI 25- 29.9 (overweight) and BMI >30 (obesity). The risk factors associated with Coronary Heart Disease (Ischemic Heart Disease)were recorded.

A descriptive analysis of the characteristics of patients overall was performed, and the characteristics of patients with BMI <25 and BMI >25 were compared. Categorical variables were presented as proportions (percentage), while continuous variables were presented as mean ± SD. While comparing the characteristics of patients in the two groups, categorical variables were compared by a chi-square test, while continuous variables were compared by a t-test. A Binary Logistic Regression Analysis was performed as the outcome was binary (Ischemic Heart Disease; Yes/No). The independent variables found significant at bivariate analysis was entered in the regression model while age, and gender were forced into the regression model irrespective of their significance status. Relative risk and 95% confidence level was computed. P-value less than 0.05 was considered as significant.

RESULTS

A total number of 1492 patients were studied. Overall, 62.5% of patients were overweight/obese.

The group of patients who had BMI >25 had more females, more smokers, more patients with diabetes mellitus, hypertension, ischemic heart disease and post-menopausal women as shown in Table 1.

Table 1: Characteristics of All Patients Included in the Study

Characteristics		Overall (N=1492)	BMI <25 (N=564)	BMI > 25 (N=919)	*P-value
Age (years)		51.2±18.2	51.7±17.3	50.8±18.7	0.39
Gender	Male	49.7%	45%	55%	0.001
	Female	50.3%	36%	64%	
Smoker (yes)		14%	54%	46%	0.01
Diabetes Mellitus (yes)		19.6%	31%	69%	0.0001
Hypertension (yes)		63%	30%	70%	0.0001
Hyper-lipidemia (yes)		2.5%	12%	88%	0.0001
Post-menopansal (yes)		22.5%	36%	64%	0.04
Ischemic Heart Disease (yes)		34.7%	42%	58%	0.24

*p-values were determined by a comparison of characteristics between patients who had BMI < 25 or > 25

Table 2: Frequency of BMI Categories Among Various Age Groups

BMI Categories	Age Group 18-39 years (N=280)	Age Group 40-59 years (N=688)	Age Group ⩾ 60 years (N=491)
<25 (Normal)	111 (39.6%)	197 (43.1%)	228(46.4%)
25-30 (Overweight)	86 (30.7%)	256 (37.2%)	162 (32.9%)
>30 (Obese)	83 (29.6%)	235 (34.1%)	101 (20.6%)

In the study population overall, there were 37.4% patients who had BMI <25, 34.1% patients had BMI between 25-30 and 28.4% had BMI >30. In other words, 37.4% patients had normal BMI, while 62.5% (34.1+28.4) were overweight/obese. According to the age groups, the frequency of high BMI was more common in the age group 40-59 years where it was 71.3% (37.2% +34.1%) as shown in Table 2. 72% of the hypertensive patients (37.9 + 34.1 = 72) in our study were overweight/obese. 71.5% of the diabetic patients (42.5 + 29.0 = 71.5) in our study were overweight/obese. 59.2% males and 65.8% females in our study were overweight/obese (Table 3).

A Multivariate Binary Logistic Regression needs to be shown graphically analysis was performed to determine the risk factors associated with the development of Ischemic Heart Disease (our outcome in the study). The independent variables age (RR=1.03), Gender (RR=0.62), hyperlipidemia (RR=0.32), diabetes mellitus (RR=0.27), hypertension (RR=0.54) and BMI (RR=0.75) were found to be independently associated with the risk of developing ischemic heart disease in our study. BMI was the predictor of interest in our study (Table 4).

DISCUSSION

Our results showed that overall, there were 37.4% patients who had BMI <25, 34.1% patients had BMI between 25-30 and 28.4% had BMI >30. In other words, 37.4% patients had normal BMI, while 62.5% (34.1+28.4) were overweight/obese. Diabetic and hypertensive patients had a high prevalence of being overweight/obese, 71.5% and 72%, respectively. In a multivariate binary logistic regression analysis, the independent variables age, gender, hyperlipidemia, diabetes mellitus, hypertension and BMI were found to be independently associated with the risk of developing CHD in our study.

Table 3: Frequency of BMI Categories Among Patients with Hypertension, Diabetes and by Gender

BMI Categories	Hypertensive Patients (N=933)	Diabetic Patients (N=289)	Male (N=739)	Female (N=741)
<25 (Normal)	260 (27.8%)	82 (28.5%)	301 (40.7%)	253 (34.1%)
25-30 (Overweight)	354 (37.9%)	123 (42.5%)	270 (36.5%)	235 (31.7%)
>30 (Obese)	319 (34.1%)	84 (29.0%)	168 (22.7%)	253 (34.1%)

In our study 62.5% of the patients were found to be overweight/obese. In another study from a community in Karachi published in 2004, 52.2% of the patients were reported as being overweight or obese.[9] A European Study has reported the prevalence of BMI 25 and higher to be 82.8%.[19] Most of the studies from U.S.report a prevalence of about 70% of overweight/obesity.[3] The difference in the figures of BMI prevalence in the present study and that from Karachi can be explained on the basis that this study was carried out in a cardiology clinic where most of the patients reporting to the out-patients clinic have some co-morbidity and hence seek cardiac consultation, where as the Karachi study was a community population and hence less sick than patients reporting to a cardiac tertiary care center. However, the prevalence of obesity in our study is less than that reported from the developed countries.

We studied the risk factors associated with Coronary Heart Disease (CHD) or Ischemic Heart Disease, our outcome in this study. The independent variables age (RR=1.03), gender (RR=0.62), hyperlipidemia (RR=0.32), diabetes mellitus (RR=0.27), hypertension (RR=0.54) and BMI (RR=0.75) were found to be independently associated with the risk of developing ischemic heart disease in our study. The BMI was our predictor of interest in this study and according to our results, compared to patients with BMI>25 those with BMI <25, had a 25% less risk of developing CHD (RR=0.75, p-value <0.03). In a study from Spain, those with higher BMI had more diabetes, hyperlipidemia, left ventricular hypertrophy, cardiac failure, severe hypertension, higher fasting blood sugar and LDL cholesterol levels.[19] The results of our study are somewhat

Table 4: Multivariate Analysis to Determine Factors Associated with Ischemic Heart Disease Among Patients with BMI Less Than / Greater Than 25

Characteristics	Relative Risk	P-value
Age (Per Year Increase)	1.03	0.0001
Gender (Ref: Male)	0.62	0.0001
Smoker (Ref: Yes)	0.83	0.55
Hyperlipidemia (Ref: Yes)	0.32	0.01
Diabetes Mellitus (Ref: Yes)	0.27	0.0001
Hypertension (Ref: Yes)	0.54	0.0001
BMI (Ref: BMI >25)	0.75	0.03

similar to this one from Spain. Studying the risk factors associated with CHD in our local population is important considering the fact that the developing countries are responsible for two thirds of CVD mortality, and especially South Asians who have one of the highest rates of coronary heart disease (CHD) in the world.[13,14-17]

In our study patients with diabetes and hypertension had higher BMI compared to those who did not have these conditions. Diabetes and hypertension are highly prevalent in the South Asian countries and are important causes of CHD. Unfortunately, in our country both these conditions are on the rise and are expected to rise further in the coming decades. Some of the important reasons include genetic, the dietary habits in which bread and rice are consumed in plenty, and a high prevalence of sedentary lifestyle, all leading to obesity. Adding salt especially in tea and staple bread, and sprinkling salt while eating anything that has been cooked are common in our country, and can be one of the reason for high blood pressure. Another important factor is the fact that people have little awareness about the causes of heart disease, hypertension and diabetes, especially regarding the major risk factors.

There is a need to develop strategies to improve awareness of CHD and its risk factors, with an emphasis on lifestyle modifications among our local population. Local guidelines need to be developed for the management of CHD and its risk factors with a special attention to high BMI.

CONCLUSION

In conclusion, 62.5% of patients in our study were overweight/obese. Diabetic and hypertensive patients had a higher prevalence of being overweight/obese, 71.5% and 72%, respectively. Age, gender, hyperlipidemia, diabetes mellitus, hypertension and BMI were found to be independently associated with the risk of developing CHD.

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