ORIGINAL ARTICLE

ANGIOGRAPHIC SEVERITY OF CORONARY ARTERY DISEASE IN PATIENTS WITH METABOLIC SYNDROME

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ABSTRACT

Background: Metabolic syndrome is considered one of the important factors that increases the cardiovascular risk. The objective of this study was to determine the frequency of metabolic syndrome in patients with coronary artery disease and to compare the frequency of severe coronary artery disease in patients with and without metabolic syndrome.

Methodology: This descriptive study was carried out from January 2010 to July 2010 at Department of Cardiology, Punjab Institute of Cardiology, Lahore. Two hundred patients with coronary artery disease, planned to undergo coronary angiography were studied. They were divided into two groups; Group A with and Group B without metabolic syndrome. The severity of CAD on angiography was compared between the two groups.

Results: The mean age of patients in group A was 54±10.3 and in group B 51.4±10.5 years. There were 70(75%) males and 24(25%) females in Group A, while 80(76%) males and 26(24%) females in group B. Frequency of metabolic syndrome in the study population was 47%. Frequency of severe coronary artery disease was 66% in Group A as compared to 46% in Group B (p=0.005).

Conclusion: Frequency of metabolic syndrome is high in patients with coronary artery disease. Those with metabolic syndrome have severe coronary artery disease. Older patients have higher prevalence of metabolic syndrome and thus severe coronary artery disease.

Key words: Metabolic syndrome, Coronary artery disease, Coronary angiography.

INTRODUCTION

Coronary artery disease (CAD) is the leading cause of cardiovascular mortality, responsible for about 30% of deaths worldwide. It has been projected that cardiovascular mortality will increase from 18.1 million in 2010 to 24.2 million by year 2030.[1] One in four middle aged adults in Pakistan has CAD.[2]

Metabolic syndrome (Met S) constitute the clustering of clinical and biochemical risk factors, which increases future risk of CAD.[3] The underlying cause of Met S is central obesity which lead to insulin resistance resulting in endothelial dysfunction that causes hypercoagulable state and thrombosis.[4] Various studies have shown that prevalence of Met S is about 22% in Italy[4] and about 35.2% in Pakistan.[5]

Various studies has proposed that occurrence of Met S in patients with CAD is about 72.5%[6] and in Pakistani migrants 52%.[7] Prevalence of CAD is about 91% in people having Met S and 62% in those without Met S.[8] Significant coronary artery stenosis was present in 46.5% of patients with Met S and 26% of patients without Met S.[9]

Data on the Met S in predicting CAD is conflicting. Some studies have shown positive correlation between Met S and CAD.[10,11] While others failed to find a significant correlation.[8,12] South Asians are more prone to develop Met S because of their high percentage of body fat, abdominal obesity and insulin resistance.[13] Most of the available data so far regarding the effect of Met S on CAD is based upon studies conducted either in western world or done on Pakistani migrants, with very little knowledge about the effect of Met S on CAD in native Pakistani population.

If the frequency of severe coronary artery disease comes high in the Met S group then by better control of the components of Met S like hypertension, diabetes mellitus, dyslipidemia and by educating the patients about healthy life style we can prevent the patients from developing Met S. Moreover aggressive treatment of the patients with Met S we can prevent the development of severe coronary artery disease, thus decreasing chances of having myocardial infarction leading to decrease in morbidity and mortality of patients.

The aim of this study was to determine the frequency of Met S in patients with CAD and to

compare the severity of CAD with and without Met S in Pakistani population.

MATERIAL AND METHODS

The Study was carried out from January 2010 to July 2010 at the Department of Cardiology, Punjab Institute of Cardiology, Lahore. Two hundred patients between age 25-70 years of CAD who were planned to undergo coronary angiography were enrolled. Procedure of the research was explained to the patients. Patients with previous history of revascularization (PCI, CABG), serum creatinine >1.7mg/dl, blood pressure >180/110 mmHg and uncontrolled diabetes mellitus (FBS >200 mg/dl) were excluded from the study.

Demographic data was recorded. Waist circumference (cm) was measured midway between the lower limit of the rib cage and the iliac crest. Blood pressure was recorded in the sitting position in the right arm, using the mercury sphygmomanometer. Blood samples were drawn for glucose and lipid profile.

Met S was defined according to NCEP-ATP III criteria by the presence of ≥3 of the following: i) Fasting plasma glucose level ≥110 mg/dl or use of anti-diabetic medications, ii) TG's ≥150 mg/dl, iii) HDL-C <40 mg/dl for men and <50 mg/dl for women, iv) blood pressure ≥130/85 mmHg or use of anti-hypertensive medications and v) waist circumference ≥90 cm for men and ≥85 cm for women.

Subjects were divided into two groups, Group A (Met S present) and Group B (Met S absent) to determine the frequency of Met S in patients with CAD. Patients underwent coronary angiography using standard technique. Quantitative coronary angiography of each angiogram were performed by a single observer using "Philips Xcelra" software which expressed severity of CAD. Coronary artery stenosis of ≥50% in ≥1 coronary arteries was considered as severe, stenosis of 49-20% as mild and <20% was considered as no CAD.

The data was analyzed by SPSS Version 10.0. Presence or absence of Met S and severe CAD were taken as categorical variables and were expressed as frequency while Continuous variables like age were expressed as Mean ± SD. Group A and Group B were compared with regard to severity of CAD by using Chi-Square test and p values was calculated. p value of <0.05 was taken as significant. Data was stratified for age and gender.

RESULTS

A total of 200 patients of CAD were recruited from Department of Cardiology, Punjab Institute of Cardiology, Lahore after fulfilling the inclusion criteria. All patients under went coronary angiography. Frequency of Met S in the study population was 47%.

Table 1 shows the baseline characteristics of the patients with and without Met S. There was no difference in the mean age between two groups. Ratio of males and females in both the groups was similar, but there was overall male predominance.

Table 1: Baseline characteristics of patients with and without metabolic syndrome

Variable	Group A n=94	Group B n=106	p value
Mean age years	54±10.3	51.4±10.5	0.08
Gender			
Males	70(75%)	80(76%)	0.87
Females	24(25%)	26(24%)	
Hyper-tension	72(77%)	38(36%)	<0.0001
Diabetes	50(53%)	17(16%)	<0.0001
Smoking	23(24.5)	30(28%)	0.54
ACS			
Angina pectoris	54(57%)	55(52%)	
NSTEMI	15(16%)	17(16%)	0.67
STEMI	25(27%)	34(32%)	

NSTEMI= Non-ST Elevation Myocardial Infarction, STEMI= ST Elevation Myocardial Infarction
ACS = Acute coronary syndrome

All the five components of Met S were more prevalent in patients in Group A as compared to Group B. (Table 2).

Table 2: Components of Met S in patients with and without Met S.

Variable	Group A n=94	Group B n=106	p value
Hyperten-sion	72(77%)	38(36%)	<0.0001
Diabetes	50(53%)	17(16%)	<0.0001
Waist (cm)	97.7+8.9	88.+9.6	<0.0001
Triglcerides	198+101.4	1427.+88.2	<0.0001
HDL-C	31.8+6.8	35.5+10.2	<0.0001

HDL-C= High Density Lipoprotein- Cholesterol

Frequency of severe CAD was significantly higher in patients in Group A, 66% as compared to patients in Group B, 46%, (p=0.005). While the frequency of mild CAD was more in Group B as compared to patients in Group A. (Table 3).

Table 3: Angiographic severity of CAD in patients with and without Met S.

Variable	Group A n=94	Group B n=106	p value
Severe CAD (≥ 50% stenosis)	62(66%)	49(46%)	0.005
Mild CAD (49-20% stenosis)	14(15%)	24(23%)	0.163
No CAD (< 20% stenosis)	18(19%)	33(31%)	0.052

CAD= coronary artery disease

In Group A, 16(17%) patients had severe single vessel CAD, while 26(28%) and 18(19%) patients had double and three vessel CAD. In Group B 16(15%) patients had severe single vessel CAD, 13(12%) patients had double vessel and 21(20%) patients had three vessels CAD.

Out of 200 patients, 85 (42.5%) patients were of age ≤50 years and 115 (57.5%) >50 years. Frequency of Met S was high in patients >50 years of age as compared to those ≤50 years (53% vs. 39%, p=0.046). Prevalence of severe CAD was also significantly higher in patients of age >50 years as compared to ≤50 years (64% vs. 44%, p=0.003).

Forty-seven percent males fulfilled the criteria of Met S while 48% females had Met S, p=0.87. Fifty-nine males and 44 females had severe CAD. There was no statistically significant difference in severity of CAD between male and female patients.

DISCUSSION

We studied 200 patients of CAD undergoing coronary angiography. The prevalence of Met S was high in our study population. Severe CAD was also more prevalent in patients having Met S. There was no statistical difference between the mean age of the patients having Met S and patients without Met S.

In our study the prevalence of Met S was 47% which is similar to reported by other studies. Ravikiran et al[14] reported 45% prevalence of Met S in a population based survey among Indians at Chandigrah. Wierzbicki et al[7] reported 44% prevalence of Met S using Modified ATP III criteria in a Pakistani cohort. However, other studies have reported lower prevalence of Met S. Yasmin et al[15] reported 31% prevalence of Met S in a hospital based study of Pakistani patients with history of CAD. Gupta et al[16], in a population based survey of Indian population, reported 27.3% prevalence of Met S using ATP III criteria. Low prevalence reported by Yasmin et al[15], and Gupat et al[16] may be attributed to the different criteria used to define Met S, particularly different cut-off values for waist circumference (waist circumference of 88 cm for women instead of 85 cm used in our study and 102 cm for males instead of 90 cm in our study). Hence the prevalence of Met S varies widely, depending upon the type of study (hospital based vs. population based), baseline characteristics of the study population (e.g. ethnicity, age, history of ACS) and criteria used to define Met S.

Severe CAD was present in significantly higher number of patients having Met S as compared to those without Met S (66% vs. 46%, p=0.005). Similar association has been reported by other studies. Kip et al[12] reported statistically significant prevalence of severe CAD in patients with Met S (47% as compared to 25% in patients without Met S). Yavuz et al,[8] reported significantly higher number of patients with Met S having severe CAD as compared to patients without Met S (91% vs. 62%). Anuurad et al,[17] in a multicenter study also reported significantly higher prevalence of severe CAD in European American and African American patients having Met S as compared to patients without Met S (71% and 57% vs. 29% and 43%). Thus CAD tends to be more severe in patients with Met S in all populations studied and in different ethnic groups.

The present study showed that prevalence of Met S increases as the age advances. Similar high prevalence of Met S in older age group has been reported by Ravikiran et al[14] from Chandigrah. In WISE trial.[9] Marroquin et al reported higher prevalence of Met S in older American females as compared to younger females with suspected CAD. In our study, older patients had high frequency of Met S as well as severe CAD. It shows that as the age of the population increases the chances of clustering of risk factors increases leading to increased risk of developing CAD.

Our findings improve the understanding of the effect of metabolic abnormalities on cardiovascular risk after stratification for the presence or absence of angiographic CAD and have important clinical implications. Met S needs to be recognized as a looming danger in Pakistani popula-

tion and should be treated with aggressive lifestyle modifications at a lower threshold for risk factors than in other populations.

CONCLUSION

Frequency of metabolic syndrome is high in patients with coronary artery disease. Patients having metabolic syndrome have severe coronary artery disease. Older patients have higher prevalence of metabolic syndrome and thus severe coronary artery disease than younger ones.

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