ORIGINAL ARTICLE

Correlation of Cardiovascular Risk Factors and Severity of Coronary Artery Disease in Acute Myocardial Infarction

LIAQAT ALI, AKMAL FAIZ, AMIR BUTT, AYESHA LIAQAT
Consultant Cardiologist Wapda Hospital, Consultant Physician Wapda Hospital, Senior Registrar Cardiology Wapda Hospital, 1st year Student FMH, Department of Cardiology Wapda Hospital Lahore.
Correspondence Author:- Dr. Liaqat Ali, Consultant Cardiologist, Wapda Hospital, Lahore.
Email:- liaqatdr57@yahoo.com

ABSTRACT

Background: Coronary artery disease is the major cause of death world over. There are different risk factors which are important for the development and progression of coronary artery disease. In this study I tried to established the correlation of cardiovascular risk factors in acute myocardial infarction and their relation with severity of coronary artery disease.

Methods: This is a prospective study of 200 cases of acute myocardial infarction who were admitted in Wapda hospital Lahore from April 2013 to January 2015.All of them underwent coronary angiography. Patients were divided into two main groups, ST –elevation myocardial infarction (n=125) and Non ST-elevation myocardial infarction (n=75) and then patients with different cardiac risk factors such as diabetes mellitus, hypertension, hyperlipidemia, smoking and obesity were categorized and compared according to their presentation and then patients were regrouped according to the number of cardiovascular risk factors into two groups, one with two or less than two risk factors and other with more than two risk factors and in the end severity of coronary artery disease was compared among these two groups.

Results: There is strong association between cardiac risk factors and angiographic findings in patients with acute myocardial infarction.. Among STEMI patients,67(33.5%) were diabetic, 51(25.5%) were hypertension,28(14%) were hyperlipidemia, 35(17.5%) were smokers, and 19(9.5%) were obese. Among patients with NSTEMI, 27(13.5%) were diabetic, 17(8.5%) were hypertensive,10(5%) had hyperlipidemia,14(7%) were smokers and 7(3.5%) were obese. In STEMI group, CAD on angiography was severe in 105(84%) patients and moderate disease was present in 20(16%) patients, single. In NSTEMI group of 75 patients, 1(1.25%) patient has mild disease,11(13.75%) moderate disease and 68(85%) severe disease. Among STEMI patients, 38(19%) had two or less than two risk factors and 87(43.5%) were having more than two risk factors

Among NSTEMI group, 26(13%) patients had two or less than two risk factors, 49 (24.5%) patients had more than two risk factors. In the group with risk factors two or less than two,15(7.5%) patients had single vessel disease,17(8.5%) double vessel disease,23(11.5%) had triple vessel disease,6(3%) left main disease and only 7(3.5%) patients had diffuse CAD on angiography. Among the group with risk factors more than two 87(43.5%) were suffering from STEMI and 49(24.5%) were suffering from Non-STEMI.28(14%) patients had single vessel disease,26(13%) double vessel disease,66(33%) triple vessel disease,9(4.5%) left main disease and only 15(7.5%) patients had generalized diffuse disease.

Conclusion: There is very strong association between cardiac risk factors and severity of coronary artery disease in acute myocardial infarction. The greater are the numbers of risk factors, more severe and complex is the disease on angiography and lesser is the number of risks factors, simpler and less complex is the disease

Key Words: CAD; coronary artery disease, STEMI; ST-Segment elevation myocardial infarction; NSTEMI; Non-ST segment elevation myocardial infarction.

INTRODUCTION

Morbidity and mortality due to coronary heart disease has declined because of primary preventive measure. However coronary heart disease is still the cause of death in approximately one in every six deaths. The coronary heart disease present a great challenge to health care workers and health providers. Multiple risk factors have been identified which are important in the causation and progression of coronary heart disease and many clinical trials have demonstrated that the identification and stratification of these risk

factors may reduce the progression of coronary artery disease and hence reducing the morbidity and mortality due to coronary artery disease. There are two types of risk factors, modifiable and non modifiable. Modifiable risk factors includes hypertension, diabetes mellitus, smoking, dyslipidemia and obesity. and overwhelming clinical evidence has demonstrating that optimization of these factors reduces the risk of cardiovascular disease Non modifiable risk factors include age, gender, family history of coronary artery disease and these risk factors are also very much linked with increased risk of coronary heart disease. The mechanism is multifactorial. Both systolic and diastolic increase in blood pressure increases the risk of coronary artery disease, stroke and congestive heart failure. The use of tobacco and its products has been associated with increased risk of sudden death and coronary heart disease.

Diabetes has been considered to be an independent risk factor for cardiovascular disease. The adverse effect of diabetes effects the microvasculature, macro vasculature of the heart as well the kidney. It is found that hypertension, dyslipidemia and smoking as well as level of HbA1c are independent risk factors for subsequent coronary events and it is the degree of hyperglycemia which is more important[10].

The purpose of this study is to see the prevalence of these risk factors in acute myocardial infarction.

METHODS

This is a prospective study of 200 patients of acute myocardial infarction who were admitted in Wapda Teaching Hospital Lahore from April 2014 to January 2015.There is no gender discrimination. All patients with age more than 20 years are included.

For diagnosis of ST segment elevation myocardial infarction, two of the three criteria ;acute ischemic chest pain, ECG changes and elevated cardiac enzymes was used. For Non, clinical features, ECG changes but not ST Segment elevation and or elevated cardiac enzymes was used. Diabetes mellitus was diagnosed by having fasting blood glucose level 126 mg/dl or random blood glucose level more than 200mg/dl or HbA1c 6.5% or more or already diagnosed diabetics on antidiabetic drugs.

Hypertension was diagnosed by systolic blood pressure 150 mmHg or more and diastolic blood pressure 90mmHg or more and patients, who are known hypertensive and on antihypertensive medicines.

Obesity was taken as BMI >25 Kg/m or waist circumference more than 102 cm in male and more than 80 cm in female.

Smoking was taken as current active cigarette smoking

Hyperlipidemia was taken as total cholesterol >200 mg /dl, LDL-C >114mg/dl, HDL-C <35 mg /dl, and triglyceride >200 mg/dl after 12 hour fasting. All patients underwent coronary angiography with Judkins technique.

Coronary angiography was performed with standard femoral or radial approach and was analyzed independently by two experienced interventional cardiologists who had no knowledge of the patients clinical status. Luminal diameter stenos is of more than 50%was taken as significant coronary artery disease in 1.5 mm or more vessel. The vessel was taken as single, double or triple vessel disease, if one, two, or three vessels were involved. Left main was taken as separate entity. The mild disease is defined as luminal diameter stenos is of 20-50%,moderate disease is 50-70% stenos is and severe is more than 70% stenos is and left main disease was taken as significant if diameter stenos is 50% or more. The patients with different risk factors were compared according to the presentation and then patients were regrouped according to number of risk factors into two groups, one with two or less than two risk factors and other with more than two risk factors and then severity and extent of coronary artery disease was compared among these two groups.

RESULTS

Among 200 patients 120(60%) were male and 80(40%) were females [Table 2].Majority of patients were between 40-59 years of age (60%)[Table 1]. 125(62.5%) patients were suffering from S-T elevation myocardial infarction and 75(37.5%) were Non S-T elevation myocardial infarction [Table 3]. Among STEMI,67(33.5%) were diabetic, 51(25.5%) were hypertension,28(14%) were hyperlipidemia,,35(17.5%) were smokers, and 19(9.5%) were obese. Among patients with NSTEMI, 27(13.5%) were diabetic, 17(8.5%) were hypertensive,10(5%) were hyperlipidemic,14(7%) were smokers and 7(3.5%) were obese[Table 4]

In STEMI group CAD on angiography was severe in 105(84%) patients and moderate

disease was present in 20(16%) patients, single vessel disease was present in 21(16.8%),double vessel disease in 20(16%) patients, triple vessel disease in 77(61.6%) patients and left main disease was present in 7(5.6%) patients[Table 5].

Table 1: AGE N=200

30-39 years	20	10%
40-49 years	55	27.5%
50-59 years	65	32.5%
60-69 years	35	17.5%
>70 years	25	12.5%

Table 2: GENDER n=200

Male	120	60%
Female	80	40%

Table 3: Types of Acute Myocardial Infarction n=200

ST EMI	125	62.5%
Non STEMI	75	37.5%

STEMI –ST segment elevation myocardial infarction
Non STEMI –non ST segment elevation myocardial infarction

In NSTEMI group of 75 patients, 1(1.25%) patient has mild disease,11(13.75%) patients were having moderate disease and 68(85%) were having severe disease. Single vessel disease was found in 20(25%) patients, double vessel disease in 27(33.75%) patients, 33(41.25%) patients had triple vessel disease and only 8(10.6%) patients were having left main disease [Table 6].] Among STEMI patients, 38(19%) patients were having two or less than two risk factors and 87(43.5%) patients were having more than two risk factors. Among Non-STEMI group, 26(13%) patients had two or less than two risk factors, whereas 49 (24.5%) patients had more than two risk factors. In the group with risk factors two or less than two,15(7.5%) patients had single vessel disease,17(8.5%) had double vessel disease,23(11.5%) patients had triple vessel disease,6(3%) left main disease and only 7(3.5%) patients had diffuse CAD on angiography. Among the group with risk factors more than two, 87(43.5%) were suffering from STEMI and 49(24.5%) patients were suffering from Non-STEMI.28(14%) patients had single vessel disease,26(13%) patients had double vessel disease,66(33%) patients had triple vessel disease,9(4.5%) patients had left main disease and only 15(7.5%) patients had generalized diffuse disease and overall 89(44.5%) patients had triple vessel disease,51(25.5%) patients had double vessel disease and 43(22.5%) patients had single disease, left main in 15(7.5%) patients and 22(11.5%) patients had diffuse disease [Table 7].

Table 4: The frequency of risk factors in patients with CAD n=200

Risk factor	**STEMI**	**NSTEMI**
Diabetes mellitus	67(33.5%)	27(13.5%)
Hypertension	51(25.5%)	17(8.5%)
Hyperlipidemia	28(14%)	10(5%)
Smoking	35(17.5%)	14(7%)
Obesity	19(9.5%)	7(3.5%)

Table 5: Extent of coronary artery disease in STEMI n=125

CAD severity	**no**	**% age**
Mild (20-50%)	0	0%
Moderate (50-70%)	20	16%
Severe (>70%)	105	84%
Single vessel disease	21	16.8%
Double vessel disease	20	16%
Triple vessel disease	77	61.6%
Left main disease 50% or more	7	

Table 6: Extent of coronary artery disease in N STEMI n=75

CAD severity	**no**	**% age**
Mild(20-50%)	1	1.25%
Moderate (50-70%)	11	13.75 %
Severe >70%	68	85 %
Single vessel disease	20	25%
Double vessel disease	27	33.75
Triple vessel disease	33	41.25%
Left main disease 50% or more	8	10.6%

Table 7: Relationship of risk factors and angiographic findings n=200

	Risk factors<2 n(%)	**Risk factors>2 n(%)**	**Total n(%)**
STEMI	38(19%)	87(43.5%)	125(62.5%)
NSTEMI	26(13%)	49(24.5%)	75(37.5%)
Single vessel disease	15(7.5%)	28(14%)	43(21.5%)
Double vessel disease	17(8.5%)	26(13%)	51(25.5%)
Triple vessel disease	23(11.5%)	66(33%)	89(44.5%)
Left main disease	6(3%)	9(4.5%)	15(7.5%)
Diffuse disease	7(3.5%)	15(7.5%)	22(11%)

DISCUSSION

Diabetes mellitus, hypertension, obesity, hyperlipidemia and smoking has been recognized as the major modifiable risk factors. Many clinical trials has established their role in the development and progression of coronary artery disease and in addition modification and stratification of these risk factors has shown to reduce the future ischemic cardiac events. In patients with AMI(STEMI &NSTEMI) in our study diabetes mellitus is most common risk factor which is present in 47% of patients,34% are hypertensive,19% hyperlipidemia,24.5% are smokers and 13% are obese. A similar study was carried out by William et, al [1] and in their study 50% of patients had diabetes, which is almost similar to our study,74% were hypertensive, this is almost double than our study, this may be because of higher prevalence of hypertension in American population, dyslipidemia is 35% in their study as compared to 19% in our study, this is almost half of the percentage and this may be due to dietary habits or some other genetic and environmental factors. Smoking was found in 48% of patients in their study whereas it is almost double than in our study, which 24.5%..In their study diabetes and dyslipidemia are more prevalent risk factors, whereas in our study diabetes and hypertension are more frequent risk factors[1]. Another study by Crile James [12] was carried out by an Indian in which age prevalence is the same i.e. between 45 to 64 years whereas in our study majority of patients are between age of 40-69 years. In their study, the incidence of diabetes mellitus is 58%,whereas in our study it 47%.The incidence of hypertension is 39% in their study whereas it is 34% in our study. The incidence of dyslipidemia in their study is 71% whereas it is 19% in our study. In their study obesity was found in 16% males and 55% females whereas in our study it is found in 13% of all the study population. An other similar study by Ameenmosaet, al[3] they found significant association between the risk factors and angiographic findings in patients with IHD. In their study, there is more prevalence in males (51%),whereas in our study 60% male are having the disease,49% are smokers whereas in our study 24.5% are smokers. This increased incidence of smoking may be due to war in the region, hypertension is 47.2% in their study whereas in our study it is 34%,slightly lower in our population, dyslipidemia is 40% in their study, whereas it is 19% in our study, almost half of their study. This may be due to dietary or environmental factors. Diabetes mellitus is 23.5% in their study, whereas it is 47% in our study, which is almost double than their study. This may be due to higher incidence of diabetes in our population as compared to the Iraqi population. In their study single vessel disease was higher in STEMI, whereas in our study, triple vessel disease is more frequent in STEMI group and further more the disease is more severe in both STEMI and NSTEMI group. But the incidence of left main disease is slightly higher in NSTEMI group. This finding is consistent with the above study. Regarding the type of IHD and number of risk factors, in the current study in STEMI patients, 19% have risk factors two or less than two whereas 43.5% patients have more than two risk factors. In their study 37.6% patients had risk factors less than three and 26.3% had risk factors more than three. This is in consistent with their study. They have majority of patients with risk factors three or less than three, whereas in current study majority have more than two risk factors. The clustering is more in NSTEMI group in their study but in current study STEMI group has more risk factors clustering. In the current study, the subgroup with risk factors more than two have more incidence of single, double and triple vessel disease. This is consistent with their study. This reflects that more are the risk factors more severe is the coronary artery disease. The present study showed that incidence of risk factors is very important for prediction of coronary artery disease. More clustering of risk factors, severe is the disease. It is also very important for prevention. If we control diabetes, hypertension, hyperlipidemia, smoking and we keep weight controlled, we can reduce the incidence of STEMI and NSTEMI.

CONCLUSION

This study revealed association between cardiac risk factors i.e. diabetes mellitus, hypertension, hyperlipididmia, smoking and obesity and acute myocardial infarction and angiographic severity of CAD. The more is the clustering of risk factors, severe and complex is the CAD. The study highlighted more frequent risk factor in our population in acute myocardial infarction is diabetes mellitus followed by hypertension, smoking, hyperlipidemia, and obesity. Majority of patients have more than two risk factors. The

patients with more risk factors are needed to be managed intensively for the control of multiple risk factor.

REFERENCES

1. WilliumBennet,Daniel Lombardi,AnitaEsinhart et,al. Risk factors for acute myocardial infarction in our patient population A retrospective pilot study. New York Medical Journal
2. Cril James Risk of coronary artery disease ;A study among patients with ischemic heart disease ;Heart India ;2013(1);1 page 7-11
3. AmeenMossa Mohammad,SabriKhalifSheikho,Jasim Mohammad Tyib.Relation of cardiovascular risk factors with coronary angiographic findings in Iraqi patients with ischemic heart disease .American Journal of Cardiovascular disease research 2013 1(1),pp 25-29 DOI;10;12691/ajcdr_1-1-6