THE PREVALENCE AND HOSPITAL OUTCOME OF METABOLIC SYNDROME IN ACUTE MYOCARDIAL INFARCTION

Medicine

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ABSTRACT

AIM AND OBJECTIVES: To study the prevalence and hospital outcome of metabolic syndrome (MS) and to assess each components of ATPIII definition of metabolic syndrome in patients with acute ST elevation myocardial infarction (STEMI).

MATERIALS AND METHODS : 85 patients admitted with acute myocardial infarction in ICCU of CSI Rainy multispeciality hospital were taken. They are examined and investigated. Metabolic syndrome was defined according to the AHA/NHLBI statement maintaining NCEP-ATPIII criteria with minor modifications.

Patient was diagnosed metabolic syndrome if they had any 3 of the following criteria.
1. Abdominal obesity (Waist circumference(WC) > 90cm in men, > 80 cm in women)
2. Low HDL level   (< 40 mg/dl in men, <50mg/dl in women)
3. High blood pressure (BP>130/85 mmHg)
4. Fasting blood sugar(FBS) > 100mg/dl.
5. Triglycerides(TGL)->150 mg/dl

The heart failure was defined as the highest killip class reached during hospitalization. Patients were divided into two groups- with and without metabolic syndrome. The relative influence of MS with respect to hospital outcomes and various parameters like ventricular tachycardia, heart failure, duration of stay in ICU, recurrent MI, death were studied.

RESULTS: In total of 85 patients with acute STEMI 49% of them fulfilled the criteria of metabolic syndrome.The MS is high in the age group of 50-69 years. The females 80% of them have metabolic syndrome.The components of metabolic syndrome WC, BP,FBS,TGL were increased, HDLwas decreased in metabolic syndrome group with acute STEMI. Severe heart failure (killip class >=2) were more prevalent in metabolic syndrome group (78.4%, P=0.001). The mean ICU stay in the metabolic syndrome group was high (1.8 days, P= 0.001).

Conclusion: The prevalence of metabolic syndrome is high in acute myocardial infarction patients especially in women. The all 5 components of ATP III definition of metabolic syndrome showed strong association with myocardial infarction. Patients with metabolic syndrome have high incidence of adverse hospital outcomes such as heart failure.

INTRODUCTION

In the 21 th century cardiovascular disease was identified as the major cause of morbidity and morbidity in the developing world. During this period there was considerable effort to understand the underlying disease and to identify the risk factors. Once risk factors were identified ,it became apparent that more than one risk factor was present in the same individual. The clustering of cardiovascular disease risk factors were identified, such as obesity, type 2 dm, hyperlipidemia and hypertension. This was given a unifying name METABOLIC SYNDROME. In India both insulin resistance and metabolic syndrome are widely prevalent. The Jaipur Heart watch studies have reported that in urban Indian populations age adjusted prevalence of metabolic syndrome was 22.9% in men , 39.9% in women and 24.9% over all.(1) In rural adult population the prevalence of metabolic syndrome was reported as 39.7%.(2) Metabolic syndrome is wildly noted as one of the risk factors for emerging diabetes mellitus and cardiovascular diasease.

AIM OF THE STUDY
1. To ascertain the prevalence of metabolic syndrome in acute myocardial infarction patients.
2. To assess the each of the five components of NCEP ATP III definition of metabolic syndrome in patients with acute ST elevation myocardial infarction (STEMI).
3. To study the impact of metabolic syndrome on hospital outcomes, in particular death, heart failure ,arrhythmia, no of days in ICU and recurrent myocardial infarction in acute MI patients.

MATERIALS AND METHODS

Patients admitted with myocardial infarction in Intensive Cardiac Unit (ICU) in CSI Rainy Multispecialty hospital during the period of 2004-2006 constitute the study population. This study was done as part of post graduate training thesis. A total of 85 patients were studied. Patients were initially studied when they were in ICU and were followed up till their discharge. They were examined and investigated.

The detailed clinical study was made as per proforma.

INCLUSION CRITERIA
Patients admitted with acute ST elevation myocardial infarction (MI) in ICU.
Both sexes with all age groups were included.

EXCLUSION CRITERIA
Patients with non ST elevation MI, unstable angina were excluded.

Acute STelevation MI was diagnosed based on typical chest pain, ECG showing ST elevation or new onset left bundle branch block (LBBB) as defined by the joint committee of the European Society of Cardiology and the American College Of Cardiology. Metabolic syndrome(MS) was defined according to the AHA/NHLBI statement maintaining NCEP ATP III criteria with minor modifications. Informed consent was obtained from all participants. The detailed history and examination was taken. Body weight and height were measured. Weight circumference (WC) was measured on admission midway between the 9 th rib and iliac crest and the average of 2 measures were recorded. Vital parameters blood pressure, pulse rate, respiratory rate were recorded. ECG was taken at the time of admission and subsequent ECGs were taken as required. Echocardiography (ECHO) was performed on day 4 and all Echo parameters were studied including wall motion abnormalities, left ventricular ejection fraction. During the hospital stay data regarding ventricular arrhythmia, cardiogenic shock, recurrent MI and death were collected. Patients blood sample was collected and analysed for blood sugar, CPK,CPK-MB, lipid profile, urea, creatinine. On day four and five fasting glucose was taken and average was included as fasting glucose.

Patients were divided into two groups as with metabolic syndrome and without metabolic syndrome. In patients with STEMI the influence of metabolic syndrome on hospital outcomes and various parameters such as arrhythmia- ventricular tachyarrhythmia, heart failure,

duration of stay in ICU, recurrent MI, death were studied.

Statistical analysis
Statistical analysis was done by SPSS 6.5 version. Chi square test was applied to analyze data and to test the significance. P value less than 0.05 has taken as statistically significant.

RESULTS
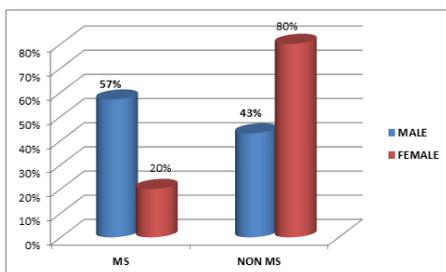**PREVALENCE OF METABOLIC SYNDROME IN ACUTE MI PATIENTS**
A total of 85 patients with acute STEMI were studied, of these 42(49%) patients fulfilled the criteria for metabolic syndrome. The remaining 43(51%) patients did not have metabolic syndrome. (Fig-1)This showed the prevalence of 49% metabolic syndrome in acute myocardial infarction. The mean age in the metabolic syndrome group was 56.6 years, whereas in the non metabolic syndrome group the mean age was 53.5 years. So the mean age of prevalence was found to be high in metabolic syndrome group. The lowest age in the study group was 27 years and the highest age was 86 years. The incidence of acute MI was high in the age group between 50-69 years. (Table-1)) The prevalence of MS tends to increase as age increases. Among the 70 male patients with myocardial infarction 30 patients had metabolic syndrome, among 15 female patients 12 of them had metabolic syndrome.(Fig-2) The prevalence of metabolic syndrome tend to increase in both sexes as age increases. But the prevalence in age group 50-75 years in females was more, indicating that metabolic syndrome was more prevalent in older age in females.

Components of metabolic syndrome- The components of metabolic syndrome abdominal obesity, blood pressure, fasting blood sugar, and triglycerides were increased and HDL was decreased in the metabolic syndrome group. Waist circumference of more than 90 cm in male and more than 80 cm in female is 88.4%, blood pressure >130/85 in 61.8%, fasting blood sugar > 100mg/dl in 80.9%, triglycerides > 150 in 75 % , reduced HDL in 91.7% in metabolic syndrome group.(Table-2) Other parameters such as recurrent myocardial infarction (57.1%), ventricular arrhythmia (77.8%), heart failure with Killips class >= 2(78.45%) were more prevalent in metabolic syndrome group. The stay in ICCU was more in the patients with metabolic syndrome (1.8 days) group. (Table-3)

Fig-1 PREVALENCE OF METABOLIC SYNDROME IN ACUTE STEMI
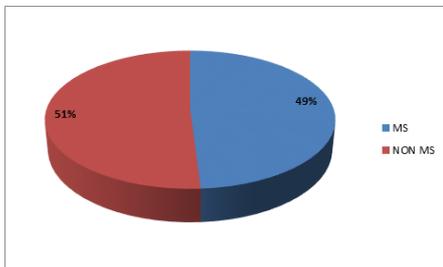
Fig-2 SEX PREVALENCE OF METABOLIC SYNDROME

Table 1 PREVALENCE OF METABOLIC SYNDROME- AGE GROUP

AGE GROUP	METABOLIC SYNDROME		TOTAL
	NO(%)	YES(%)	NO(%)
20-29	1(2.3)	1(2.4)	2(2.4)
30-39	2(4.7)	2(4.8)	4(4.7)
40-49	12(28)	6(14.3)	18(21.2)
50-59	13(30.2)	14(33.3)	27(31.8)
60-69	13(30.2)	15(36)	28(33)
70-79	1(2.3)	3(7.14)	4(4.7)
80-89	1(2.3)	1(2.4)	2(2.4)
TOTAL	43(51)	42(49)	85

Table 2 In Patients With Stemi-variable Components Of Metabolic Syndrome

Variable components		Metabolic syndrome		p value
wc	NO(%)-43	YES(%)-42		
	Male<90,Female<80	38(90.5)	4(9.5)	0.001
	Male>90,Female>80	5(11.6)	38(88.4)	
Blood pressure	<130/85	22(73.3)	8(26.7)	0.008
	>130/85	21(38.2)	34(61.8)	
Fasting blood sugar	<100mg/dl	34(89.5)	4(10.5)	0.001
	>100mg/dl	9(19.1)	38(80.9)	
HDL	Male>40,Female>50	42(57.5)	31(42.5)	0.002
	Male<40,Female<50	1(8.3)	11(91.7)	
Triglycerides	<150	36(63.2)	21(36.8)	0.001
	>150	7(25)	21(75)	

Table -3 The Various Hospital Outcome Parameters- Studied In Both Metabolic-non Metabolic Syndrome Group

VARIOUS PARAMETERS		Metabolic syndrome		p value
		NO(%)-43	YES(%)-42	
Case fatality	No	42(61.2)	40(48.2)	0.57
	Yes	1(33.3)	2(66.7)	
Recurrent MI	NO	37(52.1)	34(47.9)	0.53
	Yes	6(42.9)	8(57.1)	
VT/VF	No	41(53.9)	35(46.1)	0.07
	Yes	2(22.2)	7(77.8)	
Heart failure/KILLIP CLASS	1	32(94.1)	2(5.9)	0.001
	>2	11(21.6)	40(78.4)	
Days in ICU	1	37(74)	13(26)	0.001
	>1	6(17.1)	29(82.9)	

Discussion
The metabolic syndrome is a clinical criteria characterized by central obesity, increased fasting blood sugar, atherogenic dyslipidemia and hypertension. The components of metabolic syndrome directly promotes the occurrence of atherosclerotic cardiovasculse disease. The presence of metabolic syndrome increases the risk of atherosclerotic coronary artery disease by two fold.(4)Insulin resistance is the key pathogenic feature of this syndrome,since its components are either causes or consequences of impaired insulin action.(5)

Metabolic syndrome was defined according to the AHA/NHLBI statement maintaining NCEP-ATPIII criteria with minor modifications. (3)

Patient was diagnosed metabolic syndrome if they had any 3 of the following criteria.
1. Abdominal obesity (Waist circumference(WC) > 90cm in men, > 80 cm in women of Asian origin)
2. Low HDL level (< 40 mg/dl in men, <50mg/dl in women)
3. High blood pressure (BP>130/85 mmHg)
4. Fasting blood sugar (FBS) > 100mg/dl.
5. Triglycerides(TGL)->150 mg/dl

The prevalence of metabolic syndrome is 49% in this study in acute myocardial infarction patients. The prevalence of metabolic syndrome and the number of its metabolic features increases with the severity of angiographic coronary artery disease.(7,8) The prevalence of MS in acute MI in less than 46 years was 46.8%.(9)The prevalence of metabolic syndrome ranges from35% to 80% in patients with hypertension and type 2 dm.(8)

The incidence of metabolic syndrome was high in age group between 50-69 years. The mean age in metabolic syndrome group was 56.6 years. The mean age is very low in Indian population as compare to western studies where mean age was 70 years.(6) Considering the sex distribution MS increases with increasing the age especially in females.(6) Body mass index was a insensitive indicator of metabolic and cardiovascular complications of obesity, so waist circumference was taken as a indicator of abdominal obesity. Abdominal fat plays an important role in the etiology of metabolic syndrome. (10) Waist

circumference was increased in metabolic syndrome group (88.4%) as compare to non metabolic syndrome group. Other components such as fasting blood sugar, hypertension, hypertriglyceridemia(4) was increased in metabolic syndrome group. The prevalent component was high blood sugar 85.3% , in a non diabetic population with metabolic syndrome the prevalent component was low HDL 86%, followed by hypertension, hypertriglyceridemia lastly impaired fasting blood glucose.(13) Even high triglycerides 81.1 % was found in patients with acute myocardial infarction with metabolic syndrome.(8) Elevated blood pressure was a isolated predominant component of metabolic syndrome in acte MI patients.(14)

Heart failure was defined as the highest killip class reached during hospitalization.Severe heart failure defined as Killip class >=2(6), recurrent MI,ventricular arrhythmia was more prevalent in the metabolic syndrome group. Even case fatality ,the no of days in ICCU was increased in acute MI patients in metabolic syndrome group. It implies the importance of targeting all components of metabolic syndrome to prevent acute coronary events. Finnish Diabetic Prevention study and US Diabetic Prevention Program showed that diet and exercise had a significant effect on reducing the progression from impaired glucose tolerance to type 2 dm. (15, 16)

Conclusion

There is high prevalence of metabolic syndrome in patients with acute myocardial infarction. As the age increases the prevalence of metabolic syndrome is increasing. In women the metabolic syndrome is more prevalent in older age group. All the components of metabolic syndrome high fasting blood glucose, abdominal obesity, systemic hypertension hypertriglyceridemia were increased and HDL levels were decreased in metabolic syndrome group patients with acute ST elevation myocardial infarction. Recurrent myocardial infarction(57.1%), ventricular arrhythmia(77.8%) were more prevalent in the metabolic syndrome, but they did not show statistical significance. The incidence of heart failure was high at admission in metabolic syndrome group which was statistically significance.

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