Outcome of Patients Hospitalized with Acute Coronary Syndrome Fulfilling the Criteria of Metabolic Syndrome

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Abstract:

The aim of the study was to assess the association of metabolic syndrome in patients with acute coronary syndrome and the impact of metabolic syndrome on clinical outcome. Total 210 ACS patients were included in this study and divided in group I & II on the basis of presence or absence of MS respectively. Among the study patients mean age in group I and group II was 52.99 ± 11.49 years and 53.34 ± 12.54 years respectively. Among the risk factors, hypertension (70%vs 15%), dyslipidemia (100 vs. 97%), diabetes mellitus (36.4% vs. 6%) were significant between two groups. Mean waist circumference recorded was 103.12 ± 4.15 in group I and 96.50 ± 6.43 in group II which was significant. Present study showed, in hospital outcome was worse in group I in comparison to group II and was significant, like cardiogenic shock (11% vs. 1%), LVF (28.2% vs. 16%), and CVD (5.45 vs. 0%). But there were no significant difference in heart block, tachyarrhythmia, cardiac arrest, reinfarction and death. Complications were far more in group I than in group II (14.5% vs. 52.0%) which was also highly significant. So, we conclude that the presence of MS in patients suffered from ACS was associated with a greater incidence of in-hospital cardiovascular complications and mortality.

Key words: Metabolic syndrome, Acute coronary syndrome, Cardiovascular disease, clinical outcome.

Introduction

The frequent simultaneous presence of obesity, hyperlipidemia, diabetes, and hypertension was first described in the late 1960s.[1] This association was subsequently highlighted in the late 1970s by a number of German researchers, including Heller and colleagues.[2] They coined the term "metabolic syndrome" (MS) and described it's association with atherosclerosis. In 1991 Ferrannini E described the same clustering of abnormalities in this cardiovascular and metabolic syndrome caused by insulin resistance and named it "insulin resistance syndrome."[3] At about the same time Reaven agreed that insulin resistance was the cause of these abnormalities. He used the term syndrome X.[4] It appears that metabolic syndrome, insulin resistance syndrome and syndrome X all refer to the same clustering of risk factors associated with atherosclerosis and coronary heart disease (CHD). Today metabolic syndrome is a matter of immense public health concern for atherosclerotic presentation. The syndrome may affect more than 50% of the elderly in the United States and even higher percentages in various ethnic groups around the world.[5]

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Cardiovascular diseases particularly ischaemic heart disease is one of the main causes of morbidity and mortality. Most predisposing factors for a vascular disease have a silent course and commonly coexist in one individual, producing synergistic deleterious effects. Early determination and treatment of modifiable risk factors could prevent irreversible damage to the heart and other vasculature.[6] Only recently prevalence of this syndrome in patients with acute coronary syndrome is being studied. The prevalence of MS is high (46%) in acute myocardial infarction (AMI) patients.[7] Patients with acute MI, with or without MS, treated with primary PCI showed that MS patients had large infarct size, more in hospital complications and a marked increase of acute renal failure.[8]

A study conducted by Momen A. showed that patients of acute ST elevation myocardial infarction with MS have poor in hospital outcome than those without MS.[9] A small population based study conducted by Zaman and colleagues showed the prevalence of MS in women (>45 years) of Bangladesh is 6.2 %.[10]Jamil AA showed that patients with MS having CHD have higher triple vessel disease, increased totally occlusive lesions and more extensive and diffuse disease as compared to those without MS.[11]

The pathogenesis of MS is multifactorial. The major underlying risk factors are insulin resistance and obesity. Several factors exacerbate the syndrome. Physical inactivity,

advancing age, endocrine dysfunction and genetic aberrations affect individual risk factors. The increasing prevalence of MS in the US and worldwide, however, seems to be driven largely by more obesity exacerbated by sedentary lifestyles. In patients with MS, relative risk for atherosclerotic coronary vascular disease (ASCVD) ranges from 1.5 to 3 when diabetes not yet present, risk for progression to Type II diabetes averages about five fold increase, compared with those without the syndrome.[12]ASCVD risk in MS is greater than the sum of its measured risk factors as evident from epidemiological studies and the risk rises geometrically instead of linearly.[12] Prevalence of MS varies with age and sex. In the USA the prevalence is 7% in participants aged 20-29 years and 44% in aged 60-69 years.[13]

Methods

This cross sectional study was conducted in the department of cardiology, Dhaka Medical College Hospital, Dhaka, Bangladesh from January 2010 to December 2010 to compare the in-hospital outcome of Acute Coronary Syndrome (ACS) patients with or without metabolic syndrome (MS). Acute coronary syndrome patients presenting first time in the hospital who are fulfilling the NCEP-ATPIII definition of metabolic syndrome were included as study population and exclude those patients having previous history of myocardial infarction (STEMI, Non-STEMI) / unstable angina / PCI / CABG; patients having heart failure, cardiomyopathy, congenital heart disease, valvular heart disease and other severe co-morbid conditions (eg. Septicemia, renal and hepatic impairment).Total 210 ACS patients were included in this study and divided into two groups; group I & II on the basis of presence or absence of MS respectively. Data was collected through: Interviewing, Clinical examination &Laboratory investigation.Data was analyzed by using SPSS (Statistical package for social sciences) version 11.5.Test statistics used to analyze the data were descriptive statistics, Chi square and unpaired t- Test. Level of significance was set at 0.05.

Result and observations

Study showed that in group I maximum patients (36.4%) belong to age group of 41 to 50 years. On the other hand in group II maximum (31%) belong to age group of 41 to 50 years. Mean ± SD of age in group I and group II was 52.99 ± 11.49 years and 53.34 ± 12.54 years respectively (Table-I).

Table-I

Distribution of Acute coronary syndrome patients with or without metabolic syndrome by age groups

Age (in year)	Group		p value*
	Group I	Group II	
<40	17 (15.5)	19 (19.0)	
41-50	40 (36.4)	31 (31.0)	
51-60	26 (23.6)	24 (24.0)	
61-70	24 (21.8)	18 (18.0)	
>70	3 (2.7)	8 (8.0)	
Total	110 (100.0)	100 (100.0)	
Mean ± SD	52.99 ± 11.49	53.34 ± 12.54	0.834

Group I = ACS patients with MS, Group II = ACS patients without MS
*Chi-square test was done to measure the level of significance.

Distribution of ACS parients with or without MS by risk factors showed hypertension 70% vs 15%, (p value 0.001), hyperglycaemia 36.6% vs 6%, (p value 0.001)was statistically significant but smoking24.5% vs 30% , (p value 0.375) hyperlipidaemia 100% vs 97%, (p value 0.106) was not significant.

Table-II

Distribution of Acute coronary syndrome patients with or without metabolic syndrome by risk factors (Hypertension)

Hypertension	Group		p value*
	Group I	Group II	
Present	77 (70.0)	15 (15.0)	0.001
Absent	33 (30.0)	85 (85.0)	
Total	110 (100.0)	100 (100.0)	

*Chi-square test was done to measure the level of significance.

Table-III

Distribution of Acute coronary syndrome patients with or without metabolic syndrome by risk factors (Hyperglycaemia)

Hyperglycaemia	Group		p value*
	Group I	Group II	
Present	40 (36.4)	6 (6.0)	0.001
Absent	70 (63.4)	94 (94.0)	
Total	110 (100.0)	100 (100.0)	

*Chi-square test was done to measure the level of significant

Outcome of ACS patients with metabolic syndrome had more chance of developing left ventricular failure(LVF), 28.2% vs

16% (p value 0.034) and cardiogenic shock 10% vs 01% (p value 0.005) than that of patient of ACS without MS. (Table IV-V)

Table-IV

Distribution of Acute coronary syndrome patients with or without metabolic syndrome by complications (LVF)

LVF	Group		p value*
	Group I (n=110)	Group II (n=100)	
Present	31 (28.2)	16 (16.0)	0.034
Absent	79 (71.8)	84 (84.0)	
Total	110 (100.0)	100 (100.0)	

*Chi-square test was done to measure the level of significance.

Table-V

Distribution of Acute coronary syndrome patients with or without metabolic syndrome by complications (Cardiogenic shock)

Cardiogenic shock	Group		p value*
	Group I (n=110)	Group II (n=100)	
Present	11 (10.0)	1 (1.0)	0.005
Absent	99 (90.0)	99 (99.0)	
Total	110 (100.0)	100 (100.0)	

*Chi-square test was done to measure the level of significance.

Table-VI shows, out of all respondents, 14.5% had tachyarrhythmia, 20% had heart block, 2.7% had cardiac arrest, 5.4% had CVD, 1.8% had reinfection, 1.8% died and 15.4% had no complication in group I. On the other hand in Group II 14% had tachyarrhythmia, 17% had heart block, 52% had no complication, none had cardiac arrest, CVD, Reinfection, or Death. There is no statistically significant difference in results between group I and group II except CVD and absence of complication.

Table-VI

Distribution of Acute coronary syndrome patients with or without metabolic syndrome by complications

Complication	Group		p value
	Group I (n=110)	Group II (n=100)	
Tachyarrhythmia(VT,VF,)	16 (14.5)	14 (14.0)	0.910*
Heart block(2nd degree,CHB)	22 (20.0)	17 (17.0)	0.577*
Cardiac arrest	3 (2.7)	-	0.248**
No complication	17 (15.4)	52 (52.0)	0.001*
CVD	6 (5.4)	-	0.030**
Reinfarction	2 (1.8)	-	0.499**
Death	2 (1.8)	-	0.499**

*Chi-square test was done to measure the level of significance.
**Fisher's Exact test was done to measure the level of significance.

Discussion

Out of all respondents mean age of the study group I was 52.99 ± 11.49 years and group II was 53.34 ± 12.54 years. There was no statistically significant difference between two groups. Which was comparable with some other series. Lee et al. (2009)[14] determined the prevalence of MS in patients with acute myocardial infarction (AMI) and its prognostic effect in hospital outcomes and assessed the relative influence of each of the components of the National Cholesterol Education Program (NCEP) Adult Treatment Panel (ATP) III definition of MS.[15]

70% were male and 30% were female in group I. In group II 70% were male and 30% were female. There was no statistical difference between two groups. Lentzas et al. (2007)[16]showed the mean age was 67 ± 11years and 69% of the patients were males. Prasad et al. (2008)[17] also showed the mean age was 59 (±13) years and 80% were males.

Out of all respondents in group I, 70% had hypertension, 100% had dyslipidaemia, 36.4% had hyperglycaemia, 24.5% were smoker 31.8% had family history of cardiovascular disease. On the other hand in group II 15% had hypertension, 97% had dyslipidaemia, 6% had hyperglycaemia, 30% were smoker, and 54% had family history of cardiovascular disease. Hypertension, diabetes mellitus, family history of cardiovascular disease were statistically significant between two groups. (p value < 0.05). Also the use of antihypertensive drugs (17.3%% vs 0%) and lipid lowering drugs (3.6%vs 0%) were significantly different between two groups.

The present study is comparable with some other series. In the study of Gupta et al. (2009)[18] the prevalence of MS was 13.77%. The prevalence of individual components of MS that is hypertension in 41.77%, fasting blood sugar e"110 mg/dl in 31.11%, dyslipidemia (triglycerides e"150 mg/dl; HDL d" 40 mg/dl in men and d" 50 mg/dl in women) in 56.44% and increased waist circumference (e"40 in. in men and e"35 in. in women) in 4.44%. Prasad et al. (2008)[17] also studied the Risk factors included diabetes in 20 (19%), hypertension in 51 (48%), and dyslipidaemia in 43 (40%) patients respectively.

Present study showed, in hospital outcome was poorer in group I in comparison to group II. Like 10% had cardiogenic shock, 28.2% had LVF, 5.4% had CVD, whereas in, Group II, 1% had cardiogenic shock, 16% had LVF, none had CVD. There were statistically significant difference between these results of group I and group II. In addition, absence of complication was far more in group II than in group I (52.0%vs 15.4%), which was also highly significant statistically. But there is no significant statistical difference in tachyarrhythmia (14.5% vs 14%), heart block (2o% vs 17%), cardiac arrest

(2.7% vs 0%), 1.8% had Reinfection (1.8% vs 0%) and death (1.8% vs 0%) between the groups. All the complications were more in STEMI patients than those with NSTEMI or, unstable angina in both groups. The results are comparable with several other studies. Mytas et al.(2007)[19] showed, Group I patients (with MS) had a significantly increased number of in-hospital events (59 vs 35, p=0.032) while there was no statistically significant difference concerning in-hospital mortality.

During the one year follow-up period, they observed more frequent readmissions (20 vs 7, p=0.016) and increased mortality (16 vs 8, p=0.024) in Group I compared to Group II (without MS). Lee et al. (2009)[20] showed, the MS group had more LVF proved by low left ventricular ejection fraction (p value < 0.005). The MS group showed low left ventricular ejection fraction (p = 0.005), Hypertriglyceridemia among the components of MS is associated with major adverse cardiac events (MACE). The incidence of in-hospital death was significantly higher in group 1 (p = 0.047). Feinberg et al. (2008)[21] reported incidence of metabolic syndrome among patients with an acute coronary syndrome varied between 29% and 46%. Patients with metabolic syndrome and acute coronary syndrome had increased incidence of heart failure, and worse long-term mortality compared to those without metabolic syndrome. Perron and Sweeney (2005)[22] described, nearly 90% of patients who experienced acute myocardial infarction (AMI) developed some cardiac rhythm abnormality and 25% had a cardiac conduction disturbance within 24 h ours of infarct onset.

Conclusion:

The metabolic syndrome in subjects with cardiovascular diseases occurs considerably more often than in general population. The most frequently occurring   features of metabolic syndrome in subjects with cardiovascular diseases are: obesity, hypertension, hypertriglyceridemia and hyperglycaemia. As the presence of MS in patients suffered from ACS was associated with a higher incidence of cardiovascular complications and mortality so, early diagnosis and proper treatment of the metabolic syndrome is needed in reducing incidence and in secondary prevention of cardiovascular diseases.

Conflict of Interest : None

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