

SYNDROME X IN ACUTE CORONARY SYNDROME PATIENTS- A TERTIARY CARE CENTER STUDYYogendra Malhotra¹, Harendra Kumar Shukla², Aniketh Prabhakar³¹Associate Professor, Department of Medicine, Pt. J.N.M. Medical College, Raipur, Chhattisgarh.²Associate Professor, Department of Medicine, Chhattisgarh Institute of Medical Sciences, Bilaspur, Chhattisgarh.³PG Student, Department of Medicine, Pt. J.N.M. Medical College, Raipur, Chhattisgarh.**ABSTRACT**

Metabolic Syndrome (MS) or insulin resistance syndrome is commonly defined as a group of risk factors or abnormalities associated with insulin resistance that markedly increased risk for both coronary heart disease and diabetes. Cardiovascular disease and all-cause mortality, even in the absence of baseline CVD and diabetes. Early identification, treatment and prevention of the metabolic syndrome present a major challenge for health care professionals facing an epidemic of overweight and sedentary lifestyle.

AIMS AND OBJECTIVES

To study the prevalence of metabolic syndrome in pts. with Acute Coronary Syndrome (ACS) and its effect on hospital outcomes.

MATERIALS AND METHODS

Observational study in 55 cases (28 cases and 27 controls) was conducted in Dr. BRAMH, Raipur and each patient was assessed with detailed clinical history and was also assessed for parameters of MS. The cases and controls were also followed up during their hospital stay for the presence of or development of heart failure, arrhythmias, shock and death. Chi square and 't' test were used to analyse obtained data.

RESULTS AND CONCLUSIONS

In the present study sex ratio amongst the cases was (M:F) 1.15:1 and 2.6:1 in controls. Maximum patients were between the ages of 50-60. Non-ST elevation MI was more common in patients with metabolic syndrome and they presented late to the hospital for treatment. Hypertension and fasting hyperglycemia are the most prevalent components of metabolic syndrome in patients of acute coronary syndrome. Our Study also suggests that hypertriglyceridemia is the most common lipid abnormality in patients of acute coronary syndrome. An increase in the incidence of heart failure was observed in patients with metabolic syndrome. Cardiogenic shock is seen with increased frequency in patients with metabolic syndrome. Case fatalities were seen with equal frequency in both the groups, hence metabolic syndrome is not associated with increased case fatality while ventricular arrhythmias have equal incidence in both the groups.

KEYWORDS

Acute Coronary Syndrome, Metabolic Syndrome, Hypertriglyceridemia.

HOW TO CITE THIS ARTICLE: Yogendra Malhotra, Harendra Kumar Shukla, Aniketh Prabhakar. "Syndrome X in Acute Coronary Syndrome Patients- A Tertiary Care Center Study." Journal of Evolution of Medical and Dental Sciences 2015; Vol. 4, Issue 102, December 21; Page: 16796-16800, DOI: 10.14260/jemds/2015/2519

INTRODUCTION

Syndrome X, also referred to as Metabolic syndrome or Insulin resistance syndrome, is commonly defined as a group of risk factors or abnormalities associated with insulin resistance that markedly increase risk for both coronary heart disease and diabetes.¹

In 2001, the NCEP ATP III provided a new definition for metabolic syndrome. The definition incorporates thresholds for the following 5 variables: waist circumference (>102cm in men and >88cm in women), concentrations of triglycerides (>150mg/dl), High Density Lipoprotein (HDL) cholesterol (<40mg/dl in men and <50mg/dl in women), fasting plasma glucose (>110mg/dl), and blood pressure (>130/85mmHg). A classification of metabolic syndrome is triggered when predefined limits of any 3 of these 5 criteria are exceeded.²

The prevalence of metabolic syndrome was 19.52% in a study in urban India and was noted to be more (Almost double) in males.³ In the United States (US), the prevalence of the MS in the adult population was estimated to be more than 25%. Similarly, the prevalence of MS in 7 European countries was approximately 23%. It was estimated that 20%-25% of South Asians have developed MS and many more may be prone to it.⁴⁻⁵

ATP III identified 6 components of the metabolic syndrome.⁶

Abdominal obesity (Increased waist circumference) is the form of obesity most strongly associated with metabolic syndrome.

Atherogenic dyslipidemia manifests in routine lipoprotein analysis by raised triglycerides and low concentrations of HDL cholesterol.

Elevated blood pressure strongly associated with obesity and commonly occurs in insulin-resistant persons.

Insulin resistance is present in majority of people with the metabolic syndrome. Patients with long-standing insulin resistance frequently manifest glucose intolerance.

A pro-inflammatory state, recognized clinically by elevations of C-reactive Protein (CRP) is commonly present in persons with metabolic syndrome.

Financial or Other, Competing Interest: None.

Submission 03-12-2015, Peer Review 04-12-2015,

Acceptance 16-12-2015, Published 21-12-2015.

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DOI:10.14260/jemds/2015/2519

A pro-thrombotic state, characterized by increased plasma Plasminogen Activator Inhibitor (PAI)-I and fibrinogen, also associates with metabolic syndrome.⁷ Cardiovascular disease and all-cause mortality are increased in men with metabolic syndrome, even in the absence of baseline CVD and diabetes. The present study would prove beneficial in enhancing our knowledge about the metabolic syndrome and its impact on cardiovascular diseases, especially among persons from tribal and low socio-economic areas of Chhattisgarh in a developing country like India. Early identification, treatment and prevention of the metabolic syndrome present a major challenge for healthcare professionals facing an epidemic of overweight and sedentary lifestyle.⁸

AIMS AND OBJECTIVES

With the above pretext we decided to conduct a case control study on randomly recruited patients of acute coronary syndrome who fulfil the ECG criteria for ACS. After excluding subjects with age less than 20 years and more than 89 years. Patients with Diabetes Mellitus Type I, Patients with recent history of trauma to chest, Patients with acute respiratory infections, Patients with history of sickling, Patients with history of acute hepatitis, 55 patients of acute coronary syndrome were selected with the following aims and objectives.

1. To ascertain the number of patients of acute coronary syndrome with metabolic syndrome.
2. To study the impact of metabolic syndrome on hospital outcomes in patients of acute coronary syndrome, in particular death and heart failure.
3. To assess the relative influence of each of the five components of the NCEP ATP III definition of metabolic syndrome on the risk of death and heart failure.

MATERIAL AND METHODS

The present study was conducted in the Department of Medicine, Pt. J. N. M. Medical College and DR. BRAM Hospital, Raipur (CG). Each patient included in the study was assessed

by, detailed clinical history regarding age, sex, presenting complaints and its duration. Past history of Diabetes Mellitus, Hypertension, Ischemic Heart Disease, Transient Ischemic Attack, Stroke, Sickling and liver diseases. Family history of premature Coronary Artery Disease in first degree relatives (Age <55 years for men and <65 years for women) was elicited. Waist circumference, Body Mass Index, Blood Pressure, Complete Lipid Profile, Fasting Blood Sugar and Post Prandial Blood Sugar, Serial ECGs, Diagnostic cardiac markers, Chest X-ray and Fundus examination.

- Data concerning long term therapy before admission was acquired including Aspirin, Beta blockers, Angiotensin Converting Enzyme (ACE) Inhibitors and Statins.
- In hospital outcome data was collected including Death, ventricular arrhythmias (Ventricular Tachycardia or Ventricular Fibrillation), Stroke, Recurrent Myocardial Infarction and cardiogenic shock.
- Heart failure was defined as the highest Killip class reached during hospitalization. Severe Heart Failure was defined as Killip class greater than II.⁸
- Cardiogenic shock was defined as Systolic Blood Pressure <90mmHg persisting for >1 hour despite fluid challenge and associated with clinical signs of hypoperfusion. (Hasdal D, et al. 2000).
- Diabetes Mellitus and impaired fasting glucose level were defined according to the American Diabetes Association definition.

STATISTICAL ANALYSIS

Chi square test was done on categorical variables to find out significance and student 't' test was done to compare means between the cases and control groups.

RESULTS

The present study had 28 cases (ACS with MS) and 27 controls (ACS without MS). Sex ratio amongst the cases was (M:F) 1.15:1 and 26:1 in controls. Age distribution was as per Figure 1.

Prevalence of the Metabolic Syndrome and its Components

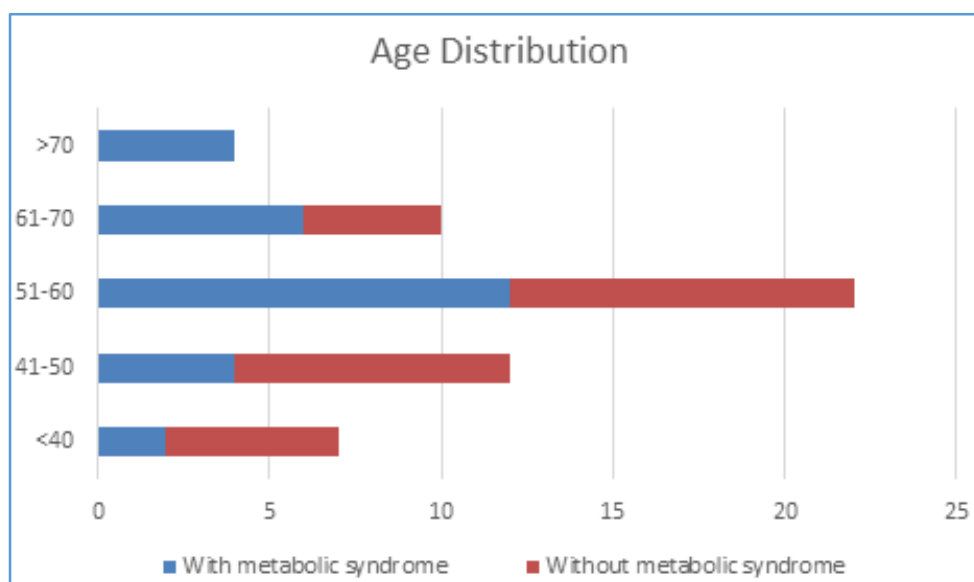


Fig. 1: Age-wise Distribution of patients with Acute Coronary Syndrome with and without Metabolic Syndrome

In the subjects the most common symptom on presentation was chest pain followed by anxiety. Out of the 28 patients with MS 17 had STEMI and 11 had NSTEMI amongst 28 patients without MS 20 had STEMI and 7 had NSTEMI. In the patients with MS the least prevalent finding was low HDL most common abnormality amongst the criteria was fasting hyperglycemia and was followed by raised BP. Equal incidence of hypertriglyceridemia and abdominal obesity was observed. In both cases and controls overall, most prevalent was high BP. (Table -1). Out of 55 patients, majority (17 patients, 30.9%) were having two of the components of metabolic syndrome, one component only was present in 8 patients (14.5%), three components in 11 patients (20%), four criteria in 14 (25.5)

while five criteria were present in 3 patients (5.5%); 2 patients did not fulfil any criteria of metabolic syndrome.

None of the subjects included in the study fulfilled all the five criteria defining metabolic syndrome. The mean fasting blood sugar was more in the metabolic syndrome group. There was significant difference in blood pressures of female cases and controls, there was no significant difference between cases and control in terms of triglyceride levels, but the difference was significant when HDL levels were compared and found to be lower in metabolic syndrome group, mean abdominal circumference was more in the metabolic syndrome group when compared to the controls also higher BMI were noted in the metabolic syndrome group.

Component	With Metabolic Syndrome		Without Metabolic Syndrome		Total		P value
	No.	%	No.	%	No.	%	
Fasting Hyperglycemia	26	76.5	8	23.5	34	61.8	>0.05
Low HDL Level	17	89.5	2	10.5	19	34.5	0.0001
High Triglycerides	20	62.5	12	37.5	32	58.2	>0.05
High Blood Pressure	23	59	16	41	39	70.9	-
Abdominal Obesity	20	91	2	9	22	40	0.0001
BMI							
<25	12	34.3	23	65.7	35	63.6	0.0001
25-30	13	76.5	4	23.5	17	30.9	
>30	3	100	0	0	3	5.5	

Table 1: Prevalence of components of Metabolic Syndrome in patients of Acute Coronary Syndrome with and without Metabolic Syndrome

Hospital outcomes with respect to Metabolic Syndrome: (Table: 2)

Hospital Outcome	With Metabolic Syndrome		Without Metabolic Syndrome			Total	
	No.	%	No.	%	No.	%	
Heart Failure	11	57.9	8	42.1	19	34.5	
Cardiogenic Shock	3	60	2	40	5	9.1	
Ventricular Arrhythmia	2	50	2	50	4	7.3	
Case Fatality	5	50	5	50	10	18.2	
Discharged	23	51.1	22	48.9	45	81.8	

Table 2: In Hospital Outcomes in patients of Acute Coronary Syndrome with and without Metabolic Syndrome

Among the 28 patients with metabolic syndrome case fatality was seen in 18% patients, while 82% were discharged. Heart failure was seen in 39% patients, cardiogenic shock in 11% patients and ventricular arrhythmias in 7% of patients with metabolic syndrome.

Among the 19 patients with heart failure, 14 (73.7%) had fasting hyperglycemia, 9 (47.4%) had low HDL level, 13 (68.4%) had high BP, 8 (42.1%) had abdominal obesity, 9 (47.4%) had high triglyceride level. So fasting hyperglycemia was the most common component among patients with heart failure followed by high blood pressure and then by low HDL and hypertriglyceridemia. Abdominal obesity was the least common component among patients with heart failure. Low HDL was significantly associated with heart failure (p<0.05).

Among the 36 patients without- heart failure, majority 72.2% were with high B.P., followed by 63.9% with elevated triglyceride level, 55.5% with fasting hyperglycemia, 38.9% with abdominal obesity and 27.7% with low HDL level.

Out of the 10 patients who died, 90% were having fasting hyperglycemia, 50% were having low HDL, 30% were having high BP, 20% were having Abdominal Obesity and 70% were having elevated TG levels. The most common component of metabolic syndrome among the case fatality group was fasting hyperglycemia followed by hypertriglyceridemia, low HDL, high BP and abdominal obesity. Among the discharged patients, fasting hyperglycemia and hypertriglyceridemia were most common (55.5%), while high BP (22.2%) was the least common.

Of the 34 patients having fasting hyperglycemia, 26% died while 74% were discharged. Of the 19 patients having low HDL levels, 26% died while 74% were discharged. Of the 39 patients with high BP, 8% died; 91% of the patients with abdominal obesity were discharged while 9% died; 22% of the patients with hypertriglyceridemia had case fatality while 78% patients were discharged. So case fatality was more common in the patients having fasting hyperglycemia and low HDL levels.

DISCUSSION

As in previous studies by Zeller M, et al.² and Amowitz LL, et al.⁹ in our study, out of 55 patients 28 patients (51%) had metabolic syndrome while the rest 21 patients (49%) did not have Metabolic Syndrome.

In our study, males constituted majority (74.5%) of patients while females accounted for 25.5% cases. Among the male patients, majority (63.4%) were without Metabolic Syndrome, while the rest 36.6% were with Metabolic Syndrome. Among the female patients majority (92.8%) were with Metabolic Syndrome, while the rest 7.2% were without Metabolic Syndrome. Our study implies that Metabolic Syndrome is more common among female population and is in accordance with the studies by Zeller M, et al. and Azizl et al.¹⁰ The overall increased proportion of male patients may be due to the male dominant population and increased proportion of males having access to health care facilities.

Our study suggests that ST elevation MI was more common in patients without metabolic syndrome while non-ST elevation MI was more common in patients with metabolic syndrome. We concluded that the patients with metabolic syndrome present to hospital later than those without metabolic syndrome.

With our study we infer that hypertension and fasting hyperglycemia are the most prevalent components of metabolic syndrome in patients of acute coronary syndrome low HDL level was the least frequent one this was in similarity of studies done by Amowitz et al.⁹ Tenerz A, et al.¹¹ and Zeller M, et al.²

Metabolic syndrome is more common in patients having fasting hyperglycemia. Impaired glucose tolerance is one of the commonest components of metabolic syndrome in patients with coronary artery disease. These findings are comparable to the previous studies. Our study suggests that low HDL is more common among females as compared to males (In accordance with Chopra HK, et al.¹²) and is the least common component of metabolic syndrome, but hypertriglyceridemia was more common in males with metabolic syndrome and ACS.

Mean abdominal circumference was found to be higher in the Metabolic Syndrome group and our study also suggests that mean BMI is higher in patients with metabolic syndrome and most patients with metabolic syndrome have BMI in the range of 25-30kg/m². The prevalence of metabolic syndrome increases with increase in BMI as all patients with BMI >30kg/m² had metabolic syndrome.

Our study suggests that female patients fulfil more number of criteria of metabolic syndrome as compared to males. Majority of the patients fulfilled two criteria while in the metabolic syndrome group, four criteria were found in the majority. The higher number of criteria found in our study as against other studies may be due to the small sample size and higher prevalence of metabolic syndrome in our study cohort. Our study also suggests that the combination of fasting hyperglycemia with hypertension and hypertriglyceridemia is the most prevalent combination among patients with acute coronary syndrome. In males the most common combination is IFG+HTN+Hyper TG, while among females the most common combinations are IFG+LowHDL+Obesity and HTN+lowHDL+Obesity.

Our study is comparable to the study by Achari V, et al.¹³ and suggests that hypertriglyceridemia is the most common

lipid abnormality in patients of acute coronary syndrome with and without metabolic syndrome followed by low HDL in patients with metabolic syndrome and hypercholesterolemia in patients without metabolic syndrome (29% vs 22%); overt Diabetes Mellitus was more common in patients with metabolic syndrome (48% vs 8%).

An increase in the incidence of heart failure was observed in patients with metabolic syndrome (Comparable to study by Zeller M, et al.² Case fatalities were seen with equal frequency in both the groups, hence metabolic syndrome is not associated with increased case fatality. This finding may be due to the small number of case fatalities included in the study due to the practical difficulty in obtaining data on patients dying within few hours of hospitalization. Cardiogenic shock is seen with increased frequency in patients with metabolic syndrome while ventricular arrhythmias have equal incidence in both the groups (Comparable to study by Zeller M, et al.).

To conclude our study showed that metabolic syndrome is seen in majority of patients of acute coronary syndrome, especially in females and highlights the detrimental impact of metabolic syndrome on short term outcomes, particularly heart failure and cardiogenic shock. Our study suggests that among metabolic syndrome components, hyperglycemia has the strongest relation to increased incidence of heart failure in patients with metabolic syndrome and acute coronary syndrome.

Given the ever increasing prevalence of metabolic syndrome worldwide, this finding has important clinical implications and confirms the importance of evaluating glycemic control during the acute phase of myocardial infarction. Awareness among physicians, early identification, management, and prevention of metabolic syndrome may provide opportunities to intervene earlier in the development of shared disease pathways that predispose individuals to both cardiovascular disease and diabetes. This will help to reduce the morbidity and mortality associated with cardiovascular disease.

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