Scholars Academic Journal of Biosciences (SAJB) **ISSN 2321-6883 (Online)**
Sch. Acad. J. Biosci., 2016; 4(3A):218-223 **ISSN 2347-9515 (Print)**

(An International Publisher for Academic and Scientific Resources)
www.saspublisher.com

Original Research Article

Association between Metabolic Syndrome and Acute Coronary Syndrome in Central India

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Abstract: The Metabolic Syndrome (MS) comprises a constellation of metabolic abnormalities occur together more often than expected by diversity. The MS has its own meaning as it is a predictor of future cardiovascular disease (CVD) actions and diabetes. Aim of this study was to identify the prevalence and risk factors associated with MS among acute coronary syndrome. A total of 100 patients of acute coronary syndrome were examined for metabolic syndrome. MS was identified with application of IDF (international diabetes foundation) criteria and NCEO/ATP III (National cholesterol education program/adult treatment panel-III). History of hypertension, diabetes, drug intake, smoking and alcohol was taken. Relevant general and systemic examination was carried out as per hospital protocol. All patients were subjected to routine investigations like complete haemogram, serum electrolyte, renal, liver and lipid profile. Fasting and postprandial blood sugars were measured according to standard protocol. In resuts the Prevalence of MS was 59% using IDF criteria and 49% with using NCEP-ATPIII criteria. In all patients in both groups presentation of ST elevation myocardial infarction (STEMI) was more common. Sedentary lifestyle was the risk factor for MS, it was also reflected in our study around 70% patients with diagnosis of MS was having sedentary lifestyle. Among the components of MS we found statistically significant difference in FBS, TGL, BP and Waist circumference in patients with MS than without MS. In concusion the Patients with metabolic syndrome had high prevalence of acute coronary syndrome, so lifestyle modification should be undertaken to prevent complications secondary to this syndrome.
Keywords: Acute Coronary Syndrome, Cardiovascular Disease, Metabolic Syndrome.

INTRODUCTION

In current era of fast development we all are bothered the life style diseases very much than past era. Metabolic syndrome (MS) is one of the worrisome risk factors for cardiovascular disease (CVD). The CVD is the most important worldwide cause of death, calculating for 18.2million deaths per year, a number that is predictable to grow to 24.6 million by 2030 [1,2]. Progressively more, populations affected are those in low and middle-income countries, where 80% of these deaths occur [1]. Affected individuals are typically younger than individuals from higher income countries and have more limited human and financial resources [2,3]. By identifying it as responsible factor for development of new cardiac actions as well as complicating the existing cardiac problem, we will have better understanding of that and we can take aggressive step to prevent development of MS and promoting betterment of life.

Accordingly, MS has been endorsed as a means for identifying the risk of diabetes development in clinical practice. The MS is defined by a cluster of metabolic risk factors including: central obesity, hypertension (HT), impaired fasting glucose (IFG) or impaired glucose tolerance (IGT), diabetes mellitus (DM), and dyslipidemia (DLD), which dispose an individual to develop CVD and type 2 diabetes mellitus[4-6]. Lately, it has been sturdily recommended that situation by recognized diabetes should be expelled from the definition of MS [7]. However, data supporting this recommendation are incomplete, especially regarding coronary atherosclerosis.

MS is considered a clinical predictor of CVD [4,8,9] and patients with MS have a higher incidence of acute coronary syndrome (ACS) than individuals without MS [10, 11]. However, it is still contentious whether the ACS risk associated with MS is above and beyond the risk allied with its individual components [12, 13]. In addition, the value of MS in predicting ACS risk in patients with DM is contentious, since these patients could have an augmented risk of ACS irrespective of the diagnosis of MS.

Some studies have indicated that CVD incidents were significantly associated with high density lipoprotein cholesterol (HDL-C) levels, systolic blood pressure (SBP), sex and total cholesterol (TC), but not with the presence of MS[14]. Likewise, MS was not predictive of ACS patients with DM [15]. Moreover, it has been suggested that the prediction of ACS by MS is primarily based on high fasting blood glucose levels [16] and that the relationship between MS score and ACS severity was unclear in the presence of DM [17,18].

The association of MS with ACS severity has not yet been investigated in the Central India. In this context, the primary aim of this study was to evaluate the prevalence and risk factor of MS in patients with ACS. As well as we also compared the incidence of major CVD events, severity of CAD, need for urgent revascularization, in hospital mortality between the two groups i.e. ACS with or without MS.

MATERIAL AND METHODS:

This study was undertaken in 100 patients of ACS with more than 18 years of age admitted in period of 1 year from Nov 2013- Oct 2014 in the Department of Medicine of a tertiary care center. Out of these 100 patients of ACS (ST elevation myocardial infarction(STEMI), NON STEMI or unstable angina), patients with MS were identified with application of IDF (international diabetes foundation) criteria and NCEO/ATP III (National cholesterol education program/adult treatment panel-III). The patients were divided in two groups. One group of patients was ACS without MS(NMS) and another group was ACS with MS(MS).

After a person labeled as ACS and MS a thorough history taking and clinical examination was performed. In history particular reference was made for the presence of symptoms like details of past and family illnesses, chest pain, perspiration, dyspnea, headache, giddiness, syncope, palpitation, edema feet, and fatigability. History of hypertension, diabetes, drug intake, smoking and alcohol was also enquired. General examination was carried out as per hospital protocol. Serum electrolyte, renal, liver and lipid profile, fasting and postprandial blood sugars were measured according to standard protocol.

Statistical Analysis was performed by entering data on SPSS 20.0(IBM SPSS Inc, USA). Qualitative data between two groups were assessed using chi Square test. Student t test was applied to see the difference in mean values of a quantitative data.

RESULTS:

The prevalence of MS was 59% (72.9% male and 27.1% female) with IDF-criteria and 49% (61.2% male and 38.8% female) with using NCEP-ATP-III criteria (Table 1).Number of male patients was higher in both groups. Our study not aimed at a particular population or age group, the bulk of patients found between 41 to 70 years age group.

Out of these 100 patients we found the more common presentation of ACS was STEMI (62%) followed by unstable angina (UA) (23%) and Non STEMI (15%). There was no significant difference in prevalence of presenting symptoms. In MS group of patients STEMI presentation was 59.32% followed by UA (25.42%) and Non STEMI (15.25%). In NMS group STEMI was present in 65.85% of patients (Table 1).

The62% ACS was found having sedentary lifestyle (69.49% in MS group and 51.21% in NMS group) with the urbanization, more people was living sedentary lives. A MS having a sedentary lifestyle was 69.49% of patients. The typical life of an urban Indian involves prolonged hours of sitting and unhealthy style of eating.

History of tobacco consumption in form of chewing or snuffing was present in 32.2% patients of MS group and 41.46% of NMS group (table1). The smoking was found to be in more numbers of patients in both groups (50.84% in MS group and 43.9% in NMS group). We observed no significant difference in tobacco consumption and smoking in these two groups. BMI of >25 kg/m^2 was observed in 55.9% patients MS group and 36.58% in NMS group.

Type 2 diabetes was present in 69 out of 100 patients. Of these 69 patients 48 had MS (table 2).There was a significant difference in percent prevalence of patients having normal and impaired fasting blood sugar ($P < 0.05$).

Elevated values of TG(>150 mg/dl) were found in 49% of total patients. A 66% patients was having more than cut off value of triglyceride for MS in group MS and 24.47% in NMS group, and the difference in two group was significant($p<0.05$).81.25% of the females have HDL<50 mg/dl and 41.86% male patients have HDL<40 mg/dl in MS group. In NMS group 53.84% females were having HDL<50 mg/dl and 32.14% of male had HDL< 40 mg/dl, difference in two group was not statistically significant ($p>0.05$) (table 2).

A total 46% patient was having BP> 130/85, out of which 45.8% was male and 46.4% was female. 28.81% patient was having stage-1 hypertension, and 30.5% patients were having stage-2 hypertension in MS group. In MS group 66.1% patients were having BP 130/85mm Hg whereas in NMS group 29.3% patients were having pre-hypertensive range of BP(Table 2).The difference observed in two groups was also statistically significant ($p<0.05$).

In MS group 58.1% male and 62.5% female patients was having waist circumference more than cut off point as per IDF criteria whereas in NMS group 58.5% male and 21.9% females (table 3) were having increased waist circumference, difference observed was

significant (p<0.05). A total 41.6% male and 46.4% female had a waist circumference, fulfilling the criteria as per ATP-III criteria. A total 62.82% male and 67.85% female subjects have waist circumference in range of criteria of MS as per IDF criteria of metabolic syndrome. Cut off point for waist hip ratio for Indian is 0.9 for male and 0.85 for female. In our study 83.7% male in group MS and 21.95% in NMS group was found with W/H>0.9.all females in study was having increased W/H ratio. A waist hip ratio cutoff for obesity, 57.69% of male and 100% of female had obesity.

Table 1: Demographic profile in two groups

	ACS-ONLY (NMS)	ACS+MS (MS)	Total	P value
Gender				
Male	29	43	72	0.9928
Female	12	16	28	
Total	41	59	100	
PRESENTATION				
STEMI	27 (65.85%)	35 (59.32%)	62 (62%)	0.7633
NON STEMI	06 (14.64%)	09 (15.25%)	15 (15%)	
UA	08 (19.51%)	15 (25.42%)	23 (23%)	
Total	41 (41%)	59(59%)	100 (100%)	
LIFESTYLE				
Sedentary	41 (69.49%)	21 (51.21%)	62 (62%)	0.1006
Non sedentary	18 (30.50%)	20 (48.78%0	38 (38%)	
Total	59 (100%)	41 (100%)	100 (100%)	
Tobacco	17 (41.46%)	19 (32.20%)	36(36%)	0.4611
Smoking	18 (43.90%)	30 (50.84%)	48(48%)	0.6311
Alcohol	01 (02.43%)	05 (8.4%)	06(6%)	0.4111

Table 2: Clinical and biochemical profile of the patients

	ACS+MS (MS)			ACS-ONLY (NMS)			TOTAL	P value
	M	F	Total (%)	M	F	Total (%)	No/%	
BMI								
<18	20	00	02 (3.3%)	01	0	01 (02.43%)	03	NA
18-22.9(Normal)	10	01	11 (18.64%)	07	04	11 (26.82%)	22	
23-24.9(Over weight)	08	05	13(22.03%)	10	04	14 (34.14%)	27	
>25 (Obese)	23	10	33 (55.9%)	11	04	15 (36.58%)	48	
FBS								
<100 mg%	01	0	01(01.69%	05	02	07 (17.73%)	08	<0.05
100-125mg%(IFG)	07	03	10(16.94%)	10	03	13(31.70%)	23	
>126mg%(Diabetic)	35	13	48(81.35%)	14	07	21(51.21%)	69	
S.TGL values (mg%)								
<150 mg%	15	05	20(33.89%)	23	08	31 (75.60%)	51	<0.05
150-199mg%	16	03	19(32.20%)	03	02	05(12.19%)	24	
200-499mg%	11	08	19(32.20%)	02	02	04(09.75%)	23	
500mg%	01	0	01(01.69%)	01	0	01 (02.43%)	02	
<150 mg%	15	05	20(33.89%)	23	08	31 (75.60%)	51	
S.HDL values (In mg%)								
<40 mg%	18	08	26(44.06%)	09	06	15 (36.58%)	41	NS
40-49mg%	16	05	21(35.59%)	11	01	12(31.70%)	33	
50-59mg%	03	02	05(08.47%)	07	02	09(19.51%)	14	
≥60 mg %	06	01	07(11.86%)	02	03	05(12.19%)	12	
BLOOD PRESSURE								
<120/80	7	0	7(11.86%)	16	06	22 (55.65%)	29	<0.05
120-139/80-89	10	7	17(28.81%)	09	03	12(29.26%)	29	
140-159/90-99	13	4	17(28.81%)	01	0	01(02.43%)	18	
≥160/≥100	13	10	39(66.10%)	03	03	06(14.63%)	24	
≥130/≥85 Cutoff of metabolic syndrome	29	10	39(66.10%)	04	03	07(17.03%)	46	

Table 3:Anthropological parameters of patients

		ACS+MS (MS)	ACS-ONLY (NMS)	TOTAL	P Value
WAIST CIRCUMFERENCE					
Male	<90cm	18(41.86%)	05(12.19%)	23(29.48%)	<0.05
	≥90cm	25(58.13%)	24(58.53%)	49(62.82%)	
Female	<80cm	06(37.50%)	03(07.31%)	09(32.14%)	
	≥80cm	10(62.50%)	09(21.95%)	19(67.85%)	
WAIST–HIPRATIO					
MALE	≤0.9	07(16.27%	20(48.78%	27(34.61%)	<0.05
	>0.9	36(83.72%)	09(21.95%)	45(57.69%)	
FEMALE	≤0.85	0 (0 %)	0 (0 %)	0 (0 %)	
	>0.85	16(100%)	12(29.26%)	28(100%)	

DISCUSSION

Incidence of MS is on the rise in the world over, due to changes in dietary patterns, lack of exercise, stress etc in general population. The study was done to know the strong association of MS and ACS. Though we know that MS is strong risk factor for CAD, apart from that significant proportion of population with MS may present with severe cardiac events in form of ACS. Different studies show higher prevalence in female, like study done at Chennai [19] showed prevalence of 36.4% for male and 46.5% for female while study done at Jaipur [20] showed prevalence of 7.9 % for male and 17.5% for female. In our study, number of male patients is higher. So in clinical practice it is very much important for us to detect MS by identifying person at risk .We can prevent it in various ways like life style modification, dietary advice, exercise, weight reduction, timely intervention in form of pharmacological intervention. By early detection of MS we can decrease significant burden of cardio vascular morbidity and mortality.

The prevalence of MS is rapidly increasing worldwide [21,22], and is affecting approximately 31% of adults in South Korea [23]. MS and diabetes share many common characteristics, and 65–85% of diabetic patients have MS [24,25]. Despite the similarities, MS is considered as a pre-morbid condition rather than a clinical diagnosis and has been promoted as a means of identifying the risk of diabetes development [26]. However, most definitions of MS simultaneously include diabetes in the diagnostic criteria as a component of impaired fasting glucose. The World Health Organization (WHO) strongly recommends that the conditions of established diabetes or CVD should be excluded from MS [27], but data supporting this recommendation are limited.

Last few decades of the 20th century have witnessed a paradigm shift of the medical science in its therapeutic and preventive approaches for several non-communicable diseases. With the receding threats of communicable diseases, epidemics of Coronary Artery Disease, Hypertension and DM have emerged. In search of etiology of these disorders, insulin resistance stood common candidate for causation of array of metabolic disarrangement. As recent theories are added to explain causative role of insulin resistant in different disorders, it became fundamental to identify the patients who are insulin resistant and prone to have major disorders. MS has been emerged to serve this need. In our study 69 % of patients had of diabetes type 2 and 23% of patients had impaired fasting glucose, which is comparable to other previous studies [28, 29].

In present study, 69.49 % of patients having metabolic syndrome have a sedentary lifestyle that is comparable to Jaipur Heart Watch Study[30]in which they reported 68% patients having sedentary lifestyle. Though tobaccos are known to be adverse cardiovascular risk associates, not much per se is known about their role directly in causation of MS. However they are known to cause dyslipidemia, obesity, impaired fasting individually; hence a risk of clustering of these factors definitely exists. In present study approximately half of the patients having MS were smoker.

In the present study total 41.66 % male and 46.42% female had a waist circumference, fulfilling the criteria as per ATP-III criteria and which is comparable to other studies by, Gupta *et al.;* [20] and Jaipur Heart Watch Study[30], which had similar values. Total 62.82% male and 67.85% female subjects have waist circumference in range of criteria of metabolic syndrome as per IDF criteria of metabolic syndrome. In our study 83.72 % male in group MS and 21.95% in NMS are found with W/H>0.9 and 100% females in study are having increased W/H ratio. It is comparable to Jaipur Heart Watch Study [30] which also shows female preponderance, except in study by Wilson et al[29], which is done in Finland and shows male preponderance.

The MS is a constellation of interrelated risk factors of metabolic origin, metabolic risk factors, that appear to directly promote the development of atherosclerotic cardiovascular disease. Patients with the MS also are at five times increased risk for developing type 2 diabetes mellitus. In the past few years, several

expert groups have attempted to set forth simple diagnostic criteria to be used in clinical practice to identify patients who manifest the multiple components of the MS. These criteria have varied somewhat in specific elements, but in general they include a combination of both underlying and metabolic risk factors. A World Health Organization (WHO) diabetes group made the first attempt in 1998. The US National Cholesterol Education Program adopted a more pragmatic approach: Adult Treatment Panel-3 (ATP-3) in 2001 with a focus on cardiovascular disease risk. The specific objective was to facilitate a clinical diagnosis. In addition, other organizations have developed similar, but again not identical, definitions. The fact that a version of the metabolic syndrome has its own ICD-9 code (277.7) also suggests that it is well thought out. In conclusion MS is strong risk factor for CAD, apart from that significant proportion of subjects among the symptomatic, Central India population with MS may present with severe cardiac events in form of ACS. However, among the components of MS we found statistically significant difference in FBS, TGL, BP and Waist circumference respectively.

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