



Original Article

Metabolic Syndrome in Female Patients with Acute Myocardial Infarction

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Abstract

Introduction and objectives: A large proportion of patients with coronary disease have metabolic syndrome. The purpose of this research was to assess the association between the metabolic syndrome (MetS) and acute myocardial infarction in female patients.

Methods: This was a case control study. Patients with a first time cardiac event of acute myocardial infarction (AMI) arriving in coronary care unit of Rajshahi Medical College Hospital, Rajshahi, Bangladesh during the period June 2013 to July 2014 were included. Metabolic syndrome and its five components were defined according to criteria set by Adult Treatment Plan III (NCEP ATP III) criteria. Blood sugars, triglycerides, HDL-C were measured within 24hrs of cardiac insult. Hypertension was defined as blood pressure $\geq 130/\geq 85$ mmHg. Abdominal obesity measured by waist circumference which is defined for Asia-Pacific region as ≥ 80 cm for women.

Results: Total 103 female patients were evaluated. Mean age was 54.28 ± 11.78 and acute myocardial infarction was more in age group 50-59 (34%). More than 60% patients suffering from acute myocardial infarction was age group 40-60 years. The metabolic syndrome was present in 74 (71.8%) female patients with acute myocardial infarction and was more frequent in women than in men (71.8% vs 37.9%, $P < .001$). The most prevalent component was low HDL-C (n 76; 73.8%), followed by fasting plasma glucose level (n 73; 70.9%).

Conclusions: The metabolic syndrome has a high prevalence in female patients with acute myocardial infarction. The most frequent components are low HDL-C levels and fasting plasma glucose level.

Keyword: Metabolic syndrome, acute myocardial infarction, NCEP ATP III, Bangladesh.

TAJ 2013; 26: 74-78

Introduction

Cough is the most important clinical symptom of respiratory disease. Patients with trivial viral respiratory tract infection to life threatening

bronchial carcinoma may all present with simple cough. Sometimes cough is the only symptom of many respiratory diseases.

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Non-specific chronic cough may be defined as a cough with duration of 3 weeks or more without any fever or systemic illness and where chest x-ray, sputum for AFB (3 samples) and spirometry are inconclusive¹.

The metabolic syndrome prevalence is increasing worldwide and is a serious public health problem. It is a combination of interrelated metabolic abnormalities that significantly increase the risk of cardiovascular disease, and type 2 diabetes mellitus (DM2)¹⁻⁶. In general population the prevalence studies in different countries showed differing proportion ranging from as low as 2.5% to as high as 58% with propensity towards older age for its consequences on diabetes and cardiovascular diseases^{7,8}. In Bangladesh, studies on hypertension, diabetes⁹ and dyslipidemia¹⁰ assessed rising prevalence. There are also prevalence studies of metabolic syndrome in rural Bangladeshi women¹¹. In the population of Bangladeshi women MetS was presented in 25.6% respondents and it was more prevalent among post-menopausal (39.3%) as compared to pre menopausal (16.8%) women¹¹. Another study conducted by Subrina Jesmine¹² et al. revealed that the prevalence rates of MetS in rural Bangladeshi women were 25.6% (NCEP ATP III), 36.68% (modified NCEP ATP III). Furthermore, 29.9% had elevated blood pressure, 30.42% had elevated fasting plasma glucose and 85.4% had low HDL-C and 26.91% had increased triglyceride values¹³. Prevalence of elevated fasting blood glucose and high triglyceride were significantly higher in post menopausal women than premenopausal women¹⁴. Among the acute myocardial infarction patients, the metabolic syndrome was 46% and the patients with metabolic syndrome were older and more likely to be women¹². In another study on acute myocardial infarction, conducted by Tariq Ashraf et al. showed that frequency of MetS was seen high in females as compared to males (54.9% in males and 78.7% in females)¹⁵. Some studies have analyzed the prevalence of MetS in patients with acute coronary disease, reporting an estimated prevalence of 41%-50% in Europe and the United States^{16,17}. Many studies revealed that each

component of MetS is individually associated with an increased risk of cardiovascular disease; however, whether MetS leads to greater cardiovascular risk than the sum of its components remains a matter of debate¹⁸.

Methods

Study Population:

Clinical histories from patients with acute myocardial infarction admitted to coronary care unit of Rajshahi Medical College Hospital, Rajshahi, Bangladesh were selected. In total, 206 patients were included in the analysis. Female patients with acute myocardial infarction were 103 as cases and male patients with acute myocardial infarction were 103 as control.

Definition of Variables:

Demographic and clinical data were obtained from the clinical histories: age, sex, weight, height, smoking, alcohol consumption, and previous lipid-lowering treatment. Fasting plasma glucose levels and lipid profile (HDL-C, and triglycerides) were measured. The diagnosis of MetS was established using modified ATP III criteria² based on the presence of 3 or more of the following 5 factors: a) waist circumference for Asia-Pacific as ≥ 90 cm for men and ≥ 80 cm, b) hypertension, defined as clinical history of documented elevated blood pressure or persistent systolic blood pressure $\geq 130/\geq 85$ mmHg, c) hypertriglyceridemia, defined as fasting plasma triglyceride levels >150 mg/dL previous to or within 24 h of admission; d) low plasma HDLc values, defined as < 40 mg/dL (1.04 mmol/L) for men and < 50 mg/dL (1.3 mmol/L) for women, measured either before or within the first 24 h of admission, and e) carbohydrate metabolism disorder, defined as previously documented impaired fasting plasma glucose levels or a history of DM2 or fasting plasma glucose levels >110 mg/dL (≥ 6.1 mmol/L) at least 48 h after admission.

Results

Total 103 female patients were evaluated. Age of the female patients was shown in *Table 1*. Mean age was 54.28 ± 11.78 and acute myocardial infarction was more (34%) in age group 50-59.

More than 60% patients suffering from acute myocardial infarction was age group 40-60 years.

Table-1 Age and sex distribution of the studied patients (cases=103)

Age in years	Female (n=103)	
	No.	%
<30	4	3.9
30-39	14	29.8
40-49	27	26.2
50-59	35	34
≥60	23	22.3
Total	103	100
Mean ± SD	54.28±11.78	

Presence of metabolic syndrome using ATPIII criteria of the study population is shown in Table 2. The metabolic syndrome was present in 74 (71.8%) female patients with acute myocardial infarction and was more frequent in women than in men (71.8% vs 37.9%, P<.001). Women with acute myocardial infarction were older and had a higher prevalence of MetS.

Table- 2 Distribution of acute myocardial patients by metabolic syndrome and sex.

Metabolic syndrome	Sex				P
	Male=103		Female=103		
	No.	%	No.	%	
Yes	39	37.9	74	71.8	<.001
No	64	62.1	29	28.2	
Total	103	100	103	100	

The most prevalent component in female patients (Table 3) was low HDL-C (n 76; 73.8%), followed by fasting plasma glucose level (n 73; 70.9%). Next were high blood pressure (64.1%) then abdominal obesity (60.2%) and triglyceride (54.4%). Mean HDL-C (female 73.8% vs male 33%, p=.000) and fasting plasma glucose levels (female 70.9% vs male 56.3%, p=.000) were greater in women than in men.

Table-3 Components of metabolic syndrome in patients with acute myocardial infarction

Metabolic components	Female (n 103)		Male=103		P
	No.	%	No.	%	
Hypertension	66	64.1%	52	50.5	0.012
HDL Low	76	73.8%	34	33	0.000
Obesity	62	60.2%	54	52.4	0.111

FPG/DM	73	70.9%	58	56.3	0.000
TG High	56	54.4%	44	42.7	0.029

Discussion

Prevalence of Metabolic Syndrome:

The present study found that female patients with AMI had a high prevalence of MetS (71.8%). This percentage is not similar to that described in other populations with atherosclerotic vascular disease. In a previous Spanish study conducted with patients in secondary prevention, the prevalence of MetS was 41% when EGIR criteria were applied¹⁹. In general population studies conducted in the United States, the prevalence of MetS was 24%⁷ whereas in a Spanish working population the prevalence was 10.2%-13.4% and was much higher in men than in women^{20, 21}. The fact that the prevalence of MetS is higher in populations with ACS than in the general population demonstrates the association between MetS and ischemic heart disease. Although the prevalence of MetS is greater in men than in women in the general population²¹, our study suggests that MetS is more prevalent in women than in men (71.8% vs 37.9%, P<.001) which is similar to the results obtained in other populations with ischemic heart disease²²⁻²⁵. This can be attributed, at least in part, to the fact that in the present study the women with AMI were older and presented a higher prevalence of low HDL-C (n 76, 73.8%; female 73.8% vs male 33%, p=.000), these results are consistent with those of other similar studies^{26,27}. In this study the HDL-C concentrations were higher in women; and there was a greater frequency of low HDL-C levels when ATPIII criteria were applied. Taking this into account, we can assume that MetS is more frequent in female patients and an important marker of cardiovascular risk among women.

Components of Metabolic Syndrome:

MetS increases cardiovascular risk and each of its components is associated with an increased risk of cardiovascular disease. In our cohort, hyperglycemia and low HDL-C levels were the most prevalent components of MetS, followed by hypertension. Residual risk of AMI depends to a great extent on low HDL-C levels. Multiple observational and prospective epidemiological studies have demonstrated that HDL-C concentrations are inversely and independently associated with the development of ischemic heart disease²⁸. The ATPIII concluded that low HDLc concentrations and high triglyceride levels are cardiovascular risk factors, regardless of LDL-C levels. In this study low HDL-C levels (73.8%) and

hyperglycemia (70.9%) were the most prevalent components of MetS, followed by hypertension (64.1%).

Conclusions

The present study shows a high prevalence of MetS in female patients with AMI. Women with AMI show a higher prevalence and a greater number of metabolic components than men. The most prevalent components of the MetS were low HDL-C concentrations and hyperglycemia, followed by hypertension.

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