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Original Article

Components Analysis of Metabolic Syndrome in Acute Myocardial Infarction Patients.

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Abstract

Background: Metabolic syndrome confers the risk of developing acute myocardial infarction which is the most common form of coronary heart disease and the single most important cause of premature death worldwide. The frequency and association of different components of metabolic syndrome on AMI are not well understood and has not been well evaluated.

Objective: The aim of this study was to assess the components of the metabolic syndrome and its association with AMI patients. This study will help in awareness building in reducing AMI by early detection of components of metabolic syndrome.

Patients and methods: This was a prospective observational study consisted of 325 AMI patients who were aged >20 years. Patients with first time AMI arriving in CCU of Rajshahi medical college during the period of 2012-2014, were included. Data were collected through interview, clinical examination, and laboratory tests within 24 hrs of AMI. Five components of metabolic syndrome were defined according to criteria set by modified NCEP ATP III (according to ethnic variation).

Results: In AMI patients (n=325), no metabolic components were in 24 (7.4%) patients, one in 53 (16.3%), 2 components in 91(28.0%), 3 components were in 61(18.8%), 4 in 67(20.6%) and all 5 components were in 29 (8.9%) patients. In this study, there was no component in 7.4% of AMI patients, at least 1 component was 92.6%, at least 2 components were 76.3%, at least 3 components were 48.3%, at least 4 components were 29.5% and at least 5 components were 8.9%. The Metabolic syndrome was 48.3% (n=157). Among metabolic syndrome (≥3 components) in AMI (n=157, 48.3%) 4 components (20.6%) were more, next was 3 components (18.8%) and than 5 components (8.9%). Overall frequencies of components in acute myocardial infarction (n=325) were in order of abdominal obesity (54.8%) > high blood pressure (54.5%) > high FPG (54.2%) > Triglyceride (46.2%) and low HDL-C (46.2%) in acute myocardial infarction. Highest percentage was observed in abdominal obesity (54.8%) followed by high blood pressure (54.5%) and FPG (54.2%).

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Conclusion: At least three (≥3) components were mostly associated with AMI. The metabolic syndrome had a high prevalence in patients with AMI. Abdominal obesity, high blood pressure and high FPG were more frequent components of metabolic syndrome.

Key words: Metabolic syndrome, acute myocardial infarction, NCEP-ATP III, ethnic variation.

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Introduction

The metabolic syndrome (MetS) is a major public-health problem worldwide. Metabolic syndrome confers a 2-fold the risk of developing cardiovascular disease (CVD) and 5-fold increase in the risk of type 2 diabetes mellitus (T2DM) over the next 5 to 10 years[1]. Further, patients with the metabolic syndrome are at 2- to 4-fold increased risk of stroke, a 3- to 4-fold increased risk of myocardial infarction (MI), and 2-fold the risk of dying from such an event compared with those without the syndrome[2] regardless of a previous history of cardiovascular events[3].

In 1967 Avogaro and Crepaldi[4] described the clustering of cardiovascular risk factors: hypertension, hyperlipidaemia and obesity. Henefeldt and Leondardt[5] in 1981 first described metabolic syndrome as clustering of several other findings: diabetes mellitus type 2, hypertension, obesity, gout, hyperlipidaemia and thrombophilia. So, an association between hypertriglyceridaemia, obesity, insulin resistance, glucose intolerance, and hypertension has been documented since the 1960s. In 1988, Gerald Reaven[6] reintroduced and popularized the concept of syndrome for the clustering of cardiovascular risk factors like hypertension, glucose intolerance, high triglycerides, low HDL- cholesterol concentration and insulin resistance. Central obesity was added by Norman Kaplan[7] in 1989 as an essential component of metabolic syndrome in addition to others abnormalities.

Several expert groups formulated different diagnostic criteria for the metabolic syndrome in different time. These definitions agree on the essential components: glucose intolerance, obesity, hypertension and dyslipidaemia. In 2001, the Adult Treatment Panel III of the US National Cholesterol Education Program (NCEP)[8] proposed a simpler definition, developed for clinical uses. The ATP III criterion is more practical and may be a better predictor of coronary heart disease (CHD) risk. ATP III provided a working definition of the metabolic syndrome, which may be easily applied to assess its prevalence in epidemiological studies. As per ATPIII, the people meeting three or more of the following criteria qualify as having the metabolic syndrome: raised blood pressure (>130/ >85mmHg), a low serum concentration of HDL cholesterol for men < 40 mg/dl (<1.03 mmol/L) and for women < 50 mg/dl (<1.29 mmol/L), a high serum triglyceride concentration > 150mg/dl (>1.70mmol/L), a high fasting plasma glucose concentration (≥6.1mmol/L), and abdominal obesity (waist circumference >102cm in men and >88cm in women.

Having even one or two features of the syndrome was associated in one study with increased risk of mortality from coronary heart disease[9]. The risk of death from all causes and cardiovascular disease increased with increased numbers of metabolic abnormalities in both man and women[10]. A high body fat mass is associated with an elevated cardiovascular risk[11,12] which increases further in the presence of additional metabolic disorder[9] and is modulated by social factors and lifestyle habits e.g. smoking, diet, physical activity[13] . It has been suggested that co-existence of this clusters of conditions, all of which predispose to cardiovascular disease[14].

Results

In AMI patients (n=325), no metabolic components were in 24 (7.4%) patients, one in 53 (16.3%), 2 components in 91(28.0%), 3 components were in 61(18.8%), 4 in 67(20.6%) and all 5 components were in 29 (8.9%) patients. In this study, there was no component in 7.4% of AMI patients, at least 1 component was 92.6%, at least 2 components were 76.3%, at least 3 components were 48.3%, at least 4

components were 29.5% and at least 5 components were 8.9%.

Among metabolic syndrome (≥3 components) in AMI (n=157, 48.3%) 4 components (20.6%) were more, next was 3 components (18.8%) and than 5 components (8.9%).

Data presented in Table 1 shows presence of metabolic syndrome components in acute myocardial infarction patients.

Table 1. Presence of Metabolic Syndrome Components in acute myocardial infarction patients (n=325).

Presence of Metabolic Syndrome Components	N (%)	Cumulative percentage N(%)
5	29(8.9)	29(8.9)
4	67(20.6)	96(29.5)
3	61(18.8)	**157(48.3)**
2	91(28.0)	248(76.3)
1	53(16.3)	301(92.6)
0	24(7.4)	325(100.0)
Total	325(100.0)	

Overall frequencies of components in acute myocardial infarction (n=325) were in order of abdominal obesity (54.8%) > high blood pressure (54.5%) > high FPG (54.2%) > Triglyceride (46.2%) and low HDL-C (46.2%) in acute myocardial infarction.

Gender wise distribution of components of metabolic syndromes in AMI patients has been shown in Table 2. In male, highest percentage was observed in abdominal obesity (52.3%) followed by high blood pressure (50.0%) and FPG (46.4%). In female, highest percentage was observed in low HDL-c (73.8%) followed by FPG (70.9%), high blood pressure (64.1%), abdominal obesity (60.2%). In comparison with male and female, among metabolic syndrome components, abdominal obesity, high blood pressure, triglyceride and FPG were more in male counterpart. Study reveals that statistical significant (p 0.05%) difference was observed in high blood pressure, triglyceride, low HDL-c and FPG. All the components except abdominal obesity were significantly more among the males than females.

Table 2 Gender wise distribution of components of metabolic syndromes in AMI patients (n=325)

Individual components	Study groups (n 325)		Total (n325) N (%)	p
	Male (n222) N (%)	Female (n103) N (%)		
Abdominal obesity	116(65.2) (52.3)	62(34.8) (60.2)	178(100.0) (54.8)	.111
High Blood pressure	111 (62.7) (50.0)	66 (37.3) (64.1)	177 (100.0) (54.5)	.012

Triglycerides	94((62.7) (42.3)	56(37.3) (54.4)	150(100.0) (46.2)	.029
Low HDL-C	74(49.3) (33.3)	76(50.7) (73.8)	150(100.0) (46.2)	.000
Fasting plasma glucose	103(58.5) (46.4)	73(41.5) (70.9)	176(100.0) (54.2)	.000

Abdominal obesity appeared to be the highest frequent components of the metabolic syndrome in acute myocardial infarction followed by high blood pressure and next was high FPG. Carbohydrate metabolism disorder was most frequent disorder over lipid metabolism.

Discussion

Metabolic syndrome in AMI was 48.3% (n=157). Occurrence of metabolic syndrome was higher than healthy population showed by a study conducted[15] by Billah SMB 2011. The result was similar with a study[16] at 2010. This finding was also similar to another study[17].

Abdominal obesity appeared to be the highest frequent components of the metabolic syndrome in acute myocardial infarction followed by high blood pressure and next was high FPG. Frequencies of components in acute myocardial infarction were in order of abdominal obesity > high blood pressure > high FPG > Triglyceride and low HDL-C in acute myocardial infarction. This was similar as the study done in 2011. This carbohydrate and lipid metabolism disorder in metabolic syndrome in AMI was similar as the study[17] done in 2011.Tariq A et al 2011 also showed that abdominal was the more frequent metabolic component[18].

The prevalence was higher than other studied[19, 20] were indicative of increasing prevalence of the components of metabolic syndrome. The rising trends of metabolic syndrome in Bangladesh may be due to economic growth, life style change, food behaviors, and ethnicity

Conclusion

Prevalence of metabolic syndrome was high in AMI patients. Abdominal obesity appeared to be the highest frequent components of the metabolic syndrome in acute myocardial infarction followed by high blood pressure and next was high FPG. At least 3 components which was known as metabolic syndrome defined by NCEP ATP III were 48.3%.

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