Original Article

Frequency of metabolic syndrome in patients with ischaemic heart disease

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Abstract

Objective: To evaluate the frequency of metabolic syndrome in patients with Ischaemic Heart Disease.

Methods: This was a cross sectional observational study. Patients with a first time cardiac event arriving in emergency room during the period October 2009 to April 2010, were included. Five components of Metabolic syndrome were defined according to criteria set by International Diabetes Federation, American Heart Association & National Heart, Lung and Blood Institute which had abdominal obesity (waist circumference) as an integral part of the syndrome. Blood sugar, triglycerides, HDL-C were measured within 24hrs of cardiac insult. Hypertension was defined as blood pressure > 130/85 mmHg. Variables were integrated for descriptive statistics.

Results: A total of 477 patients diagnosed with Ischaemic Heart Disease were inducted in the study. There were 355 (74%) males and 122 (26%) females. Frequency of metabolic syndrome in Ischaemic heart disease was seen in 195 (54.95%) males and 96 (78.7%) females ($p< 0.001$). According to recent criteria abdominal obesity was observed in 91 (81.1%) females as compared to males 219 (61.7%) ($p<0.001$) Similarly, low HDL and Hypertension were high in frequency in females. No significant difference in triglycerides levels was found in either gender.

Conclusion: Frequency of metabolic syndrome with Ischaemic heart disease was high in females as compared to males. This could be attributed to the increased prevalence of abdominal obesity.

Keywords: Metabolic Syndrome, Ischaemic Heart Disease, Abdominal Obesity (JPMA 61:729; 2011).

Introduction

The Metabolic Syndrome (MS) is a cluster of risk factors associated with increased risk of coronary heart disease.[1] The South Asian countries of Pakistan, India, Bangladesh, Sri Lanka and Nepal account for a quarter of the worlds' population and contribute to the highest proportion of cardiovascular disease.[2,3] Current and former smoking, elevated ApoB100/ApoI ratio, history of hypertension, diabetes mellitus, abdominal obesity and depression have shown significant associations with Acute Myocardial Infarction in these countries.[4] Deaths due to cardiovascular disease also occur 5 to 10 years earlier in South Asian countries than those of western countries.[5,6] Metabolic syndrome increases the risk of coronary artery disease by 7.3times in males and 10.2 times in female patients.[7]

Metabolic Syndrome was first defined in 1998 by WHO,[8] followed by National cholesterol education program adult treatment panel III (NCEP ATPIII) in 2001.[9] In 2005 both the International Diabetes Federation (IDF).[10] and the American heart association/National heart, lung and blood institute(AHA/NHLBI)[11] attempted to have a joint consensus on different clinical definitions. Abdominal obesity was considered necessary as 1 of 5 factors required for diagnosis and was made population and country specific.[12]

Frequency of Metabolic syndrome in Pakistan was described by Yasmin et al[13] but was according to NCEPATPIII criteria. With the new joint interim statement of IDF task force, it was important that the frequency of metabolic syndrome in IHD to be reviewed according to the current criteria. This study was undertaken to determine the frequency of metabolic syndrome in patients with Ischaemic heart disease.

Patients and Methods

After approval from the Ethical committee, patients in this cross-sectional study were inducted from the emergency room at National Institute of Cardiovascular Diseases, Karachi from October 2009 to April 2010. The sample size was calculated by using WHO sample size determination software. By using 30%[13] prevalence of Metabolic Syndrome with IHD at 95% confidence interval and 5% level of precision, 323 patients were required for the study.

Subjects included had Ischaemic Heart Disease (ST-segment elevation Myocardial Infarction, Non-ST Segment elevation Myocardial Infarction, Unstable angina) with electrocardiographic changes, visiting emergency room as a first time case of IHD. Patients with stroke, renal impairment and chronic obstructive pulmonary disease were excluded.

Written Informed consent was obtained from every patient/relatives. Five components of metabolic syndrome were assessed. Blood Pressure was measured by using a standard mercury sphygmomanometer with different cuff

sizes twice, after five minutes and the mean was used for analysis. Phase.1 Kortokoff sound was used for Systolic blood pressure and Phase 5 as Diastolic blood pressure. Abdominal (waist) circumference was measured by drawing a horizontal line above the uppermost lateral border of the right ilium and then cross the line to indicate the midaxillary line of the body.Measuring tape was placed in a horizontal plane at the level marked on the right side of the trunk. Measurement was made at the end of normal expiration at the nearest millimeter.[14] Fasting blood sugar and lipid profile was taken in the first twenty four hours at different times after cardiac event. Height was measured to the nearest 0.1mm.[14] BMI was calculated as weight in kilograms (floor scale for measuring weight) divided by the square of height in meters.

Metabolic syndrome was defined according to IDF 2005 criteria[12] with abdominal obesity (waist circumference) for south Asians (>90cm for men and >80cm for women) plus any two of the following: Triglycerides >150mg/dl, HDL-C for Men <40mg/dl & Women <50mg/dl. Blood pressure >130/85mmHg with Fasting glucose >100 mg/dl.

Continuous variables like age, height, weight, BMI, waist circumference and laboratory findings were calculated as mean ± standard deviation. Categorical variables like gender, history of hypertension, Diabetes mellitus, smoking, abdominal obesity and metabolic syndrome were presented in frequencies and percentages. Cross tabulation was performed to get the relation between males and females. Independent t-test for mean and chi-square for independence test were used to see significant relationship of study variables between males and females. All data were entered and analyzed through SPSS version15.P-value <0.05 was considered as statistically significant.

Results

A total of 477 patients were inducted in the study. Among them 74% were males and 26% were females. The inequal gender distribution was due to the selection of subjects by consecutive sampling method. Demographic variables are shown in Table-1. Comparisons were made for an overall gender relationship to cardiac event.

According to new joint statement streamlines definition of metabolic syndrome for individual components, elevated waist circumference and decreased HDL was more in females as compared to males (81.1% vs 61.7% & 95.9% vs 82%: $p < 0.001$, $p < 0.001$.). Similarly for hypertension systolic and diastolic BP was elevated in females (77% vs 58%, 77.9% vs 63.9%, $p<0.001$ & $p< 0.005$) Table-2.

Frequency of metabolic syndrome in Ischaemic heart disease was 54.9% in males and 78.7% in females (Table-3).

Table-1: Demographic Variable.

Variables	Total (n = 477)	Males (n = 355)	Females (n = 122)	P-value
Age (years)	53.2 ± 11.8	52.9 ± 11.6	53.8 ± 12.4	0.477
Height (cm)	169.5 ± 11.5	171.7 ± 11.3	163.2 ± 9.5	< 0.001*
Weight (kg)	71 ± 15.2	72.5 ± 15.3	66.8 ± 14.2	0.012*
BMI (kg/m2)	24.7 ± 5.9	24.6 ± 6.3	25 ± 4.4	0.593
Waist Circumference (cm)	94 ± 15.6	94 ± 15.5	94.1 ± 15.9	0.954
SBP (mmHg)	133.4 ± 25.5	131.1 ± 24.4	139.9 ± 27.5	0.001*
DBP (mmHg)	83.5 ± 13.9	83 ± 14.1	84.8 ± 13.3	0.229
Triglyceride (mg/dl)	141.4 ± 85.5	138.5 ± 75.8	149.7 ± 108.8	0.294
HDL (mg/dl)	34.2 ± 6.9	33.9 ± 6.8	34.9 ± 7.1	0.181
FBS (mg/dl)	138.2 ± 71.4	127.3 ± 49	149 ± 93.8	.001*
Clinical Diagnosis				
UA n (%)	234 (49.1%)	171 (48.2%)	63 (51.6%)	0.508
AMI n (%) (STEMI, Non-STEMI)	243 (50.9%)	184 (51.8%)	59 (48.4%)	

UA = Unstable Angina. AMI= Acute Myocardial Infarction. STEMI= ST-Elevation Myocardial Infarction. NSTEMI= Non ST Segment Elevation Myocardial Infarction. SBP= Systolic Blood Pressure. DBP= Diastolic Blood Pressure. HDL= High Density Lipoprotein. FBS= Fasting Blood Sugar. *Significant.

Table-2: Frequency of Individual Component of Metabolic Syndrome with IHD.

Variables	Total (n = 477)	Males (n = 355)	Females (n = 122)	P-value
^WC (cm)	318 (66.7%)	219 (61.7%)	99 (81.1%)	< 0.001*
SBP > 130 mmHg	300 (62.9%)	206 (58%)	94 (77%)	< 0.001*
DBP > 85 mmHg	322 (67.5%)	227 (63.9%)	95 (77.9%)	0.005*
TG > 150 mg/dl	165 (34.6%)	127 (35.8%)	38 (31.1%)	0.354
HDL-C mg/dl	408 (85.5%)	291 (82%)	117 (95.9%)	< 0.001*
FBS >100 mg/dl	353 (74%)	259 (73%)	94 (77%)	0.374

^WC= Waist Circumference.
IDF Criteria for South Asians
>90cm for Men & >80cm for Women

Table-3: Frequency of Abdominal Obesity, Metabolic Syndrome and Combination of Risk Factors with Waist Circumference.

Variables	Total (n = 477)	Males (n = 355)	Females (n = 122)	P-value
Abdominal Obesity	318 (66.7%)	219 (61.7%)	99 (81.1%)	< 0.001*
Metabolic Syndrome	291 (61%)	195 (54.9%)	96 (78.7%)	< 0.001*
Components of Metabolic Syndrome	n = 291	n = 195	n = 96	
AO + Any 2 Component	91 (31.3%)	64 (32.8%)	27 (28.1%)	0.42
AO + Any 3 Component	127 (43.6%)	83 (42.6%)	44 (45.8%)	0.598
AO + All 4 Component	73 (25.1%)	48 (24.6%)	25 (26.1%)	0.796
AO + EBP+Low HDL-C	194 (67%)	117 (60%)	77 (80%)	.001*
AO + EBP+ EFBS	152 (52%)	93 (48%)	59 (61%)	.026*

Table-3 shows a rise in abdominal obesity in females, 81.1% as compared to males 61.7% with p<.001.Regarding abdominal obesity along with any two components for metabolic syndromes, frequency was 32.8% in males as compared to females 28.1% p= 0.420 which was probably due to combination of other variables. Females with IHD in different combinations, with abdominal obesity as an integral part of Metabolic syndrome, low HDL and Diabetes Mellitus were on the higher side as compared to Males (80% vs 60%, p< 0.001 and 61% vs 8% p< 0.026).

Discussion

Our study demonstrated that frequency of metabolic syndrome in Ischaemic heart disease patients according to IDF 2005 was 79% in females and 55% in males.

Similar study but with NCEP ATIII criteria[13] showed frequency of MS in IHD to be less in males and females when compared to the current study. The difference is due to the revised criteria especially with the waist circumference. As shown in other studies[4] higher prevalence of metabolic syndrome in women were due to low physical activity, lack of daily intake of fruits and vegetables, psychosocial factors, history of hypertension and diabetes.

Analysis of mortality data in South Asian countries has shown that fatal coronary heart disease is encountered at a younger age groups as compared to European or Chinese ethnicity.[15-17] Mean age in our study was 52.9 ± 11.6 years in males and 53.8 ± 12.4years in females which is the same as the study conducted by Prashant Joshin et al.[4] The younger age of first exposure with Ischaemic Heart Disease appears to be explained by higher prevalence of risk factors in this region.

Higher rates of Abdominal obesity appears to be due to low regular physical activity.[4] Physical activity increases insulin sensitivity and HDL-C, lowers BP, improves endothelial function and reduces risk of Type 2 diabetes mellitus and central obesity.[18-22] Waist circumference and diabetes mellitus was higher in women in our study. Physical activity is culturally unacceptable for most Muslim women.[4] Daily exercise and brisk walking for 35 to 40 minutes was associated with 50% reduction in cardiac events.[18]

The metabolic syndrome cannot be taken as the sole risk for coronary artery disease because other risk factors like age, sex, smoking and LDL cholesterol levels are not included in the constellation.[12] Patients with metabolic syndrome are at twice the risk of developing heart disease over the next 5 to 10 years as individuals without the syndrome.[12]

The limitation of this study was absence of control patients. Case control patients were taken in INTERHEART study[4] but were potentially susceptible to biases. A study is needed to evaluate metabolic syndrome in different ethnic groups residing in the country and as a multicenter study.

Conclusion

Frequency of metabolic syndrome in Ischaemic heart disease was high in females, with large waist circumference, fasting blood sugar and hypertension. Women presented with a low HDL as compared to males. Triglycerides were about the same in both genders.

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