Original Article

Metabolic Syndrome in Female Patients with Ischaemic Heart Disease: A prospective study

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Abstract

Introduction: Metabolic syndrome is a cluster of clinical characteristics that is associated with enhanced coronary risk.

Materials and Methods: A total of 62 female patients with IHD were observed. These females were having at least one criteria of metabolic syndrome. Based on this 47 females of IHD were having 3 criteria of metabolic syndrome and 15 were having < 3 criteria. A comparison study was done in between these groups. Subjects were physically assessed for the abdominal obesity, based on waist circumference. Fasting blood samples for glucose and lipid profile were drawn and tested.

Results: In present study, women were mostly from postmenopausal age group. 69.4% were from postmenopausal age group and 30.6% were from premenopausal age group with mean age 51±10 years. There was significant positive correlation IHD and systolic and diastolic blood pressure, fasting and postprandial hyperglycemia, low HDL, high triglycerides, total cholesterol, BMI, waist circumference.

Conclusion: Mortality and morbidity was having direct correlation with number of components of Metabolic syndrome present in females with IHD.

Key words: Metabolic Syndrome, Female, Patients

INTRODUCTION

Metabolic syndrome is a cluster of clinical characteristics that is associated with enhanced coronary risk. According to NATIONAL CHOLESTEROL EDUCATION PROGRAMME ADULT TREATMENT PANEL III (NCEP ATP III) CRITERIA, metabolic syndrome is associated with a greater risk atherosclerotic disease than any of its individual.[1]

It has been studied that individuals with metabolic syndrome are at increased risk Artery Disease (CAD).[2]

Insulin resistance is a central pathophysiological process associated with metabolic syndrome.[3]

Presence of metabolic syndrome increases the risk of Coronary Artery Disease by 7.3 times in male and 10.2 times in female patients.[4]

NCEP ATP III identified Coronary Artery Disease as the primary clinical outcome of the Metabolic Syndrome.[5]

The aim of this study is to determine the frequency of Metabolic Syndrome in female patients having ischaemic heart disease.

MATERIAL AND METHODS

This is a prospective study done at a tertiary care institute in patients with acute coronary syndromes admitted in ICCU or in General medical ward. In this period 62 female patients with IHD were observed. These females were having at least one criteria of metabolic syndrome. Based on this 47 females of IHD were having > 3 criteria of metabolic syndrome and 15 were having < 3 criteria. A comparison study was done in between these groups.

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All the patients are evaluated with-
1. History
2. General physical examination.
   A. Waist circumference- Measured in a standing position at the levels of iliac crest with the help of a non- stretchable measuring tape in centimetres (cm) or inches
   B. Body mass index = Weight in kilogram (kg)/ (Height in metres (m))2
   C. Blood pressure- Measured with manual sphygmomanometer in supine position.
3. Systemic examination.
4. Investigations.
   A. Blood sugar level-Fasting & post prandial. (Enzymatic Method)
   B. Lipid profile- in mg/dl or mmo1/1
      a) Serum Cholesterol
      b) Serum Triglyceride
      c) HDL
      d) LDL
      e) VLDL
   C. Cardiac Enzyme-CPK MB
   D. Electrocardiogram
   E. 2D-Echocardiogram

Patients were classified according to Acute Coronary Syndrome as Unstable angina/NSTEMI and STEMI according to standard definitions as follows:

I. **Unstable angina/Non ST elevation MI (UA/NSTEMI):**
   Braunwald's clinical classification of UA/NSTEMI was used as below:
   Severity:
   • **Class I:** new onset of severe angina or accelerated angina; no rest pain.
   • **Class II:** angina at rest within past month but not within preceding 48 hours.
   • **Class III:** angina at rest within 48 hours.
   Clinical circumstances:
   A. Secondary angina: develops in the presence of extracardiac condition that intensifies myocardial ischaemia.
   B. Primary angina: develops in the absence of extracardiac condition.
   C. Post infarct angina: develops within Disease. 2 weeks after acute MI.
      The patients were subgrouped into UA or NSTEMI according to the absence or presence of elevated cardiac biomarker CPK MB.

II. **ST elevation MI (STEM!):**
   Typical rise and gradual fall (troponin) or more rapid rise and fall (CPK-MB) of biochemical markers of myocardial necrosis with at least one of the following:
   • Ischaemic symptoms
   • Development of pathological Q waves on the
   • ECG reading ECG changes indicative of ischaemia (ST-segment elevation or depression)

Inclusion Criteria
1. All female patients >18 years of age.
2. All the patients who are having symptoms of Ischaemic Heart
3. Patients who fulfill the criteria of Metabolic Syndrome. (as per NCEP ATP III Guidelines)

Exclusion Criteria
1. All the Male patients.
2. Female patients <18 years of age.
3. Patients having Non Cardiac Chest pain.
4. Patients not fulfilling criteria of Metabolic Syndrome as per NCEPATP III Guidelines.
5. To exclude patients with other causes of obesity like Polycystic ovarian syndrome, Hypothyroidism, Cushing's syndrome, receiving medications like steroids,antidepressants, etc and other causes of secondary obesity.

STATISTICAL ANALYSIS

Data was analyzed using statistical software, statistical Product and service solution V-16 (SPSS 16). The categorical data was presented in frequency and percent distribution. In between parameters association was tested using non parametric pearson chi square test or fishers exact test. The level of significance was selected at $p<0.05$, for accepting the difference in between the parameters as significant.

RESULTS

This is a prospective study done at a tertiary care institute between 1st September 2012 and 30th October 2014 in patients with acute coronary syndromes admitted in ICCU or in General medical ward (Tables 1-4).

Compared to females with less than 3 NCEP III criterias, it was noted than in 3 and more NCEP III criteriasfemales mean age was lower, BMI was greater, waist circumference was greater, Higher SBP and DBP, greater fasting and PP BSL which was statistically significant ($p<0.05$).

Out of 62 females having IHD according to metabolic syndrome, maximum were hypertensive with 3 and more NCEP ATP III, while only 12.9% were hypertensive and had less than 3 NCEP ATP III.

Table 1: Comparison of characteristics according to metabolic syndrome presence in females with IHD group statistics

Parameter	NCEP ATP III (Metabolic syndrome Criteria)		T value	Sig. (2-tailed)
	3 and more (n=47)	< 3(n=15)		
Age (years)	48.6±7.45	53.5±6.17	−2.341	0.023
Duration of DM (years)	10.81±2.38	10.80±2.28	0.008	0.994
BMI (kg/m2)	29.5±4.98	26.65±2.28	2.174	0.034
Waist circumference (cm)	96.28±10.32	86.27±6.53	3.527	0.001
Pulse	89.19±12.97	93.20±13.91	−1.024	0.310
Systolic BP (mm Hg)	151.36±10.95	138.13±18.20	3.430	0.001
Diastolic BP (mm Hg)	94.23±5.89	86.20±10.43	3.758	0.000
02 saturation (%)	95.77±3.03	95.13±2.75	0.719	0.475
HB (gm/d1)	11.026±1.070	11.333±1.086	−0.967	0.338
WBC (per cmm)	6132.34±1575.14	6645.33±1848.47	−1.053	0.297
Fasting BSL (mg%)	118.1±28.8	101.8±5.76	2.163	0.035
POST PRANDIAL BSL (MG%)	175.2±36.55	153.20±3.73	2.316	0.024
Total Cholesterol (mg%)	217.9±43.26	208.4±30.0	0.791	0.432
Triglycerides (mg%)	180.9±42.6	148.1±40.9	2.621	0.011
HDL (mg%)	42.55±7.58	44.07±7.50	−0.675	0.502
VLDL (mg%)	29.94±4.45	28.73±4.95	0.887	0.379
LDL (mg%)	88.47±18.77	87.07±11.20	0.273	0.786
HDL/LDL	0. 50±0. 13	0.51±0.10	−0.326	0.745
CPK-MB	91.13±28.9	77.4±38.3	1.469	0.147

Table 2: Past history of females having IHD according to metabolic syndrome

Past history	NCEP ATP III (Metabolic syndrome Criteria)				Total		P value
	3 and More		<3				
	Frequency	%	Frequency	%	Frequency	%	
HTN							
Absent	5	8.1	7	11.3	12	19.4	0.002
Present	42	67.7	8	12.9	50	80.6	
DM							
Absent	26	41.9	10	16.1	36	58.1	0.438
Present	21	33.9	5	8.1	26	41.9	
IHD							
Absent	43	69.4	14	22.6	57	91.9	0.819
Present	4	6.5	1	1.6	5	8.1	
CVA							
Absent	44	71	14	22.6	58	93.5	0.969
Present	3	4.8	1	1.6	4	6.5	
OC Pills							
No	44	71	15	24.2	59	95.2	0.316
Yes	3	4.8			3	4.8	

33.9% of IHD were diabetic and with 3 and more NCEP ATP III, while only 8.1% were diabetic and had less than 3 NCEP ATP Ill.

6.5% of females had IHD and with 3 and more NCEP ATP III, while only 1.6% females had IHD and less than 3 NCEP ATP III.

In 4.8% females there was CVA and 3 and more NCEP ATP III and only 1.6% females had CVA and less than 3 NCEP ATP III.

There was OC Pills consumption history in 4.8% female along with 3 and more of NCEP ATP III criterias.

There was statistically significant (p<0.05) difference of Hypertension while insignificant (p>0.05) difference of DM, IHD, OCPuse and CVA history compared to metabolic criterial differentiation of NCEP ATP Ill.

Raised TGs with 3 and more NCEP ATP III metabolic criteriaswas found in 32.3% than 12.9% with less than 3 NCEP ATP Ill criterias. Lower HDL with 3 and moreNCEP ATP Ill metabolic criterias was noted in 54.8% females compared to17.7% with less than 3 NCEP ATP Ill metabolic metaboliccriterias.

There was statistically significant difference TG's and HDL (p<0.001) compared to the NCEP ATP Ill metabolic

Table 3: Lipid profile of females having IHD according to metabolic syndrome

Lipid profile	NCEP ATP III (Metabolic syndrome Criteria)				Total		P value
	3 and more		<3				
	Frequency	%	Frequency	%	Frequency	%	
Total cholesterol							
Normal	27	43.5	7	11.3	34	54.8	0.465
Raised	20	32.3	8	12.9	28	45.2	
TGs							
Normal	18	29	11	17.7	29	46.8	0.018
Raised	29	46.8	4	6.5	33	53.2	
HDL							
Low	34	54.8	3	4.8	37	59.7	<0.001
Normal	13	21	12	19.4	25	40.3	
LDL							
Normal	34	54.8	13	21	47	75	0.259
Raised	13	21	2	3.2	15	24.2	

Table 4: Mean age in various metabolic syndrome studies in females

	Number (sample size)	Place	Study population	Mean age (years)
Our study	62	India	ACS	51±10
SamraYasmi n et.al.(2007)[6]	100	Lahore (Pakistan)	ACS	56±12.5
K Pravee n et.al.(2002)[7]	4081	Kochi (India)	ACS	61.8±10.49
Mishra et.al.(2004)[8]	157	Berhampur (India)	ACS	51.5
Ulf Linblad et.al.(2001)[9]	1259	California	ACS	72.9

criterias in females with IHD, while no significant (p<0.05) (p>0.05) difference was noted of Total cholesterol and LDL.

DISCUSSION

This is a prospective study done at a tertiary care institute between 1st September 2012 and 30th October 2014 in patients with acute coronary syndromes admitted in ICCU or in General medical ward. The age range in our study was 36 to 64 years. The mean age was 51±10 years. This comparably favoured with other Indian studies. However the mean age was decade higher in western population studies.

In present study, women were mostly from postmenopausal age group. 69.4% were from postmenopausal age group and 30.6% were from premenopausal age group. Oscar C. Marroquinet.all° from Women's lschaemia Syndrome Evaluation Study (WISE) showed that 75% of metabolic females werepostmenopausal with mean age of 58±12 years. NamrataChhabra et.al.[11] observed that the mean age of postmenopausal women was 57.25±0.80 years.

In our study 50 out of 62 females were hypertensive i.e. 80.6% and is the most common risk factor of metabolic syndrome associated with ischaemic heart disease in women. Tan M C et.al.[12] noted that hypertension was present in 91.2% of patients with systolic BP 136.5±20.9 mm Hg and diastolic BP 79.4±12.6 mm Hg. Oscar C. Marroquinet. all° from Women's Ischaemia Syndrome Evaluation Study (WISE) showed that 91.8% had hypertension with metabolic syndrome. AmiteshAggarwal et.al.[13] observed that 76.9% of hypertensive female with metabolic syndrome had Coronary Artery Disease.

In our study Diabetes Mellitus was present in 41.9% i.e. 26 out of 62 patients. AmiteshAggarwal et.al.[13] observed that 32.1% of females were having DM with metabolic syndrome with CAD. Oscar C. Marroquinet.all° observed that 25.5% of females were having DM with metabolic syndrome.

In our study duration of diabetes mellitus was 10±6 years with metabolic syndrome. Tan M C et.al.[12] noted that duration of diabetes mellitus was 11.5±8.7 years in Cardiovascular Disease. Vijay Achari et.al.[14] observed that duration of diabetes mellitus was 10.99±7.6 years in metabolic syndrome with Coronary Artery Disease

CONCLUSION

In our study, mean age of female patients with Metabolic syndrome with IHD is 51±10 years i.e. perimenopausal age. Postmenopausal women were most commonly affected than premenopausal having Metabolic syndrome with IHD

i.e. 69.4% were from postmenopausal age group and 30.6% were from premenopausal age group.

In our study, BMI of female patients with Metabolic syndrome with IHD was raised in 43.5 % and was in range of 29.5±4.98kg/m2.

In our study, waist circumference of female patients with Metabolic syndrome with IHD was >88 cm in 62.9% and was in range of 96.28±10.32 cm.

In our study, most common risk factor of metabolic syndrome associated with IHD in women was Hypertension (80.6%) i.e. statistically significant p<0.05 followed by Diabetes Mellitus 41.9%.

In our study, duration of Diabetes mellitus was 10±6 years with metabolic syndrome in females with IHD. In our study, dyslipidemia was present in 88.7% females with metabolic syndrome with IHD having low HDL in 59.7% and raised TG in 53%.

In our study, lower levels of HDL were statistically significant in females of Metabolic syndrome with IHD. (p<0.001) In our study, raised levels of TG were statistically significant in females of Metabolic syndrome with IHD. (p<0.05)

In our study, smoking as a risk factor of IHD was absent in all females of Metabolic syndrome. In our study, majority of females of metabolic syndrome with IHD i.e.71% presented with STEMI. (p<0.05)

In our study, ECG finding of T wave changes either primary or secondary were found in 100% female patients of Metabolic syndrome with IHD. In our study, Inferior Wall Myocardial Infarction was most common in female patients (50%) of Metabolic syndrome with IHD. In our study, Ejection fraction in 2D-ECHO was below 50% in 56.5% female patients of Metabolic syndrome with IHD.

In our study, females with higher BMI were statistically significant with IHD. (p<0.05) In our study, females with higher waist circumference were statistically significant with IHD. (p<0.001) In our study, females with higher systolic and diastolic BP were statistically significant with IHD. (p<0.001)

In our study, females with higher fasting BSL were statistically significant with IHD in Metabolic syndrome. (p<0.05) In our study, mortality and morbidity was having direct correlation with number of components of Metabolic syndrome present in females with IHD.

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