Research Article

Prevalence and predictors of metabolic syndrome among women above 35 years of age: a cross sectional study from northern India

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ABSTRACT

Background: In India, as more and more people are adopting sedentary lifestyle the prevalence of metabolic syndrome is increasing. Metabolic syndrome (MS) is a cluster of risk factors for future development of type 2 diabetes mellitus and cardiovascular diseases. The objectives of the study was to determine prevalence of metabolic syndrome among women above age of 35 years in northern India attending a gynecological outpatient department of a tertiary hospital and to find out predictors of metabolic syndrome.
Methods: Premenopausal and postmenopausal women above 35 years of age attending gynecological outpatient department were screened for the presence of metabolic syndrome, according to the criteria of modified NCEP-ATP III (National Cholesterol Education Program). Data was collected and analyzed. A p-value <0.05 was considered statistically significant.
Results: The prevalence of metabolic syndrome was 49.3% among women above 35 years of age. In the logistic regression analysis it is found that body mass index and menopausal status were two variables which significantly affected occurrence of metabolic syndrome.
Conclusions: The present study shows a high prevalence of metabolic syndrome amongst women above 35 years of age. The prevalence was higher in postmenopausal women than in premenopausal women. In logistic regression analysis it was found that menopause and body mass index are independent predictors of metabolic syndrome.

Keywords: MS, Menopause, NCEP-ATP III

INTRODUCTION

The rapid rise of non-communicable diseases is presenting a formidable challenge in 20th century which is threatening economic and social development of the world as well as the lives and health of millions across the globe.[1] Today, cardiovascular disease is one of the main causes of mortality of women in the world.[2] Considering the metabolic changes that occur in women during menopause, there is an increase in risk factors of cardiovascular diseases and incidence of these diseases in post menopause. Some believe that the increased incidence occurs just by increased age but some studies demonstrated the fourfold increase in incidence of cardiovascular diseases in post-menopause.[3]

Metabolic syndrome is a cluster of components which make the individual susceptible to Cardio vascular diseases. These components are: increased lipid accumulation in central parts of the body (abdominal obesity), insulin resistance (IR), dyslipidaemia (elevated triglyceride and LDL and decreased HDL), and hypertension. According to modified NCEP-ATP III criteria (National Cholesterol Education Program- Adult Treatment Panel III), presence of at least three of these components is considered metabolic syndrome.[4]

METHODS

After clearance from ethics committee, women above 35 years of age attending gynaecology outpatient department were included. Women who received hormone replacement therapy, or oral contraceptive in last 3 months and who were pregnant were excluded. Metabolic syndrome was defined according to modified NCEP-ATP III criteria.

After an informed consent a standard questionnaire was used. Anthropometric measurements included a waist circumference in centimetres measured at the narrowest circumference, midway between the upper border of iliac crest and the lower rib margin, whereas the hip circumference was taken as the widest measurement at the level of the greater trochanters. Height was recorded in centimetres and weight in kilograms. Body mass index (BMI) was calculated as weight in kilograms divided by the square of height in meters (kg/m^2). Overweight was defined as a BMI between 25.0 and 29.9 and obese as 30.0 or higher according to World Health Organization categories. Sitting blood pressure was measured after a 5-min rest using a standard sphygmomanometer.

Laboratory method

Blood samples were collected by venepuncture after an overnight fast for 8-12hours. Venous blood was collected for measurement of serum lipids (triglycerides and HDL-C) and fasting blood glucose, respectively. The analysis was carried on an automated clinical chemistry analyser.

Data analysis and statistical methods

Data was entered in Epidata entry version 3.1 and analysed using Epianalysis version 2.2.2 and Epi info 7. Proportions, Chi square and logistic regression were used to analyse the data.

RESULTS

The total number of women enrolled in the study were 300, among which majority were in the age group of 35-44 years (45.3%). The mean age of the women in study population was 47.3 years. According to menopausal status 188 women were postmenopausal and 112 women were premenopausal. The mean age of the menopause in the study population was 48.9 years.

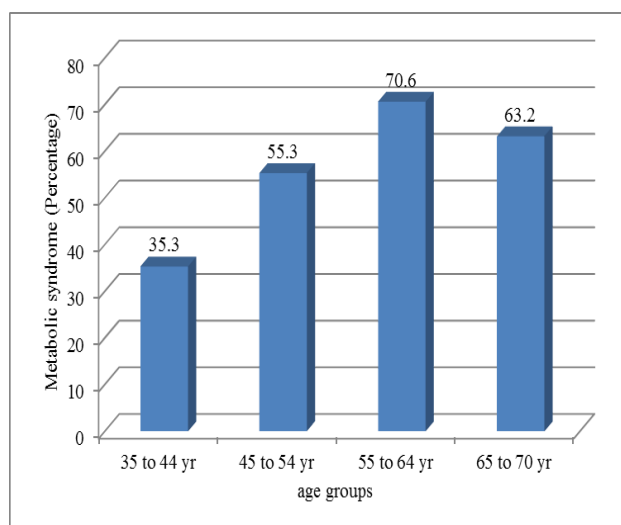**Table 1: Components of metabolic syndrome in women (modified NCEP-ATP III).**

Component	Value	Metabolic Syndrome
Waist circumference (Central obesity)	≥ 80cm	
Triglycerides	≥150 mg/dl Or on treatment for Dyslipidaemia	
HDL-C	<50 mg/dl Or under treatment for Dyslipidaemia	Any 3 criteria should be present
Blood Pressure: Systolic BP diastolic BP	>130 mm Hg >85 mm Hg Or treatment of previously diagnosed hypertension	
Fasting blood glucose	≥100 mg/dl Or previously diagnosed diabetic on treatment	

Table 2: Predictors of metabolic syndrome.

Predictor		Metabolic Syndrome		P value
		Present	**Absent**	
Waist circumference	Normal(<80cm)	6 (7.9 %)	70 (92.1%)	P< 0.001
	High (≥80cm)	142(63.4%)	82(36.6%)	
Waist Hip Ratio	Normal(<0.85)	15 (31.2%)	33(68.8%)	p= 0.006
	High (≥0.85)	133(52.8%)	119(47.2%)	
BMI	Normal (18.5-24.9)	34(32.7%)	70(67.3%)	P< 0.001
	Overweight(25-29.9)	55(48.2%)	59(51.8%)	
	Obese(≥30)	59(72%)	23(28%)	
Menopausal Status	Premenopause	71(37.8%)	117(62.2)	P< 0.001
	Postmenopause	77(68.8%)	35(31.2%)	
Age	35 to 44 yrs	48(35.3%)	88(64.7%)	P< 0.001
	45 to 54 yrs	52(55.3%)	42(44.7%)	
	55 to 64 yrs	36(70.6%)	15(29.4%)	
	65 to 70 yrs	12(63.2%)	7(36.8%)	

Table 3: Logistic regression analysis showing the predictive association of clinical variables and presence of metabolic syndrome.

Term	Odds Ratio	95%	C.I.	Coefficient	S. E.	Z-Statistic	P-Value
Age	1.0203	0.9711	1.0720	0.0201	0.0252	0.7975	0.4252
Body mass index	1.1622	1.0896	1.2397	0.1504	0.0329	4.5651	0.0000
Parity	1.3848	0.9058	2.1173	0.3256	0.2166	1.5032	0.1328
Menopausal status	2.7932	1.0693	7.2960	1.0272	0.4899	2.0968	0.0360
Waist Hip ratio	31.9676	0.8096	1262.3097	3.4647	1.8755	1.8473	0.0647
Constant	*	*	*	0.6083	270.8683	0.0022	0.9982

Figure 1: Distribution of study cases according to age and metabolic syndrome.

Overall prevalence of metabolic syndrome in our study was found to be 49.3% (n=148). In age group of 35-44 years 35.3% of woman had metabolic syndrome ,in age group of 45-54 years 55.5%, in the age group of 55-64 years 70.6% and in the age group of >65 years 63.2% had metabolic syndrome.

Metabolic syndrome was found to be present in 37.8% of premenopausal women and 68.8% of postmenopausal women and as the order of parity increases the prevalence of metabolic syndrome increases.

The prevalence of metabolic syndrome in women with normal body mass index was found to be 32.7%. In overweight and obese women it was found to be 48.2% and 72% respectively.

Increase in prevalence of metabolic syndrome with increase in waist circumference was also observed among the study cases (p<0.05). In the current study metabolic syndrome was present in 63.4% of cases with increased waist circumference (≥80cm) in comparison to 7.9% with normal waist circumference.

In all study cases it is seen that as waist hip ratio increases prevalence of metabolic syndrome also increases. Metabolic syndrome was present in 52.8% of study cases who had high waist to hip ratio (≥0.85) in comparison to 31.3% in normal waist ratio.

In the logistic regression analysis it is found that body mass index and menopausal status were two variables which significantly affected occurrence of metabolic syndrome (p<0.05). Various other factors like age, parity and waist hip ratio which was statistically significant in single variant analysis lost its significance in the logistic regression analysis.

DISCUSSION

The prevalence of metabolic syndrome was 49.3% among women above 35 years of age attending gynaecology OPD. The prevalence was highest (70.6%) among age group of 55-64 years. In the age group of 35-44 years prevalence was 35.3% followed by 55.5% in age group of 45-54 years which is similar to 34.5- 73.7% reported in the literature.[5] It was also seen that as age increased, prevalence of metabolic syndrome had also increased.[6]

Multiparity poses significant risk for development of metabolic syndrome.[7] In present study also it was noticed that as parity increases the prevalence of metabolic syndrome has also increased. Various other studies also support this positive correlation.[8,9]

Menopause is an important predictor of metabolic syndrome. In present study it is found that postmenopausal women had significantly higher prevalence of metabolic syndrome in comparison to premenopausal women (68.8% vs 37.8%) and on statistical correlation it was found to be statistically significant (p<0.05). Results of the present study are consistent with other studies in literature.[10-13]

In present study it was seen that as body mass index increases prevalence of metabolic syndrome also increases significantly. Metabolic syndrome was present in 32.7% of women who had normal BMI, among overweight woman 48.2% but among obese 72% women had metabolic syndrome. When it was statistically

correlated, this difference was statistically significant. (P<0.05) Results of the present study is consistent with the Canton Diabetes and Metabolic Disorders Study, a population based cross-sectional study in which Liang H found that higher body mass index (BMI) is positively associated with metabolic syndrome.[14] Similarly Sakurai M et al also found positive correlation between body mass index (BMI) and metabolic syndrome in Asian women.[15]

It was seen that among those who had high waist Circumference had higher prevalence of metabolic syndrome in comparison to those who had normal waist Circumference only (63.4% vs 7.9%). This positive association is in concordant with a study by Bener A et al who also found that there is significant correlation between waist circumference and metabolic syndrome and it can also effectively predict the risk of metabolic syndrome.[16]

Results of the present study is similar to a study by Bener A et al who found that waist hip ratio was significantly higher among the participants with metabolic syndrome as compared to those without metabolic syndrome (52.8% vs 31.3%).[16]

In logistic regression analysis various factors like age, parity and waist hip ratio which was statistically significant in single variant analysis lost its significance. It is found that BMI and menopausal status are two factors which significantly affect occurrence of metabolic syndrome. Logistic regression analysis revealed that prevalence of metabolic syndrome was 1.78 times higher in post-menopausal women than pre-menopausal women and menopause was an important predictor of metabolic syndrome.[10,12,13]

CONCLUSION

The present study shows a high prevalence of metabolic syndrome amongst women above 35 years of age. The prevalence was higher in postmenopausal women than in premenopausal women. In logistic regression analysis it was found that menopause and body mass index are independent predictors of metabolic syndrome.

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