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The assessment of the occurrence of metabolic syndrome among postmenopausal women

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Abstract

Background: *The menopausal state may be a potential risk factor for the development of metabolic Syndrome as its prevalence has been reported to increase after the attainment of menopause 1. Metabolic Syndrome (MS) has been demonstrated as a common precursor to the development of diabetes and cardiovascular disease (CVD) as well as a risk factor for all cause mortality. Therefore to prevent cardiovascular diseases there is a need to evaluate the occurrence of metabolic Syndrome and its components from the time of the menopause.*

Aims and Objectives: *To determine the frequency of metabolic Syndrome in postmenopausal women and to evaluate the components of metabolic Syndrome in post menopausal women.*

Methods: *All data for the proposed descriptive study was collected from the patients presenting to the Department of General Medicine, Sri Siddhartha Medical College Hospital & Research centre, Tumkur. Post menopausal women who had at least 1 year history of cessation of menses were included. clinical examination, anthropometry and other investigations (Body height, Body weight, Waist circumference (WC), Body Mass Index(BMI), Lipid profile, Fasting blood sugar, Blood pressure were done. Post Menopausal women were considered to have Metabolic Syndrome (MS) if they have any three or more of the features according to the modified ATP III Criteria.*

Results: *Metabolic Syndrome was present in 62.5% of postmenopausal women and was absent in 37.5% of post menopausal women. Abdominal obesity (68.3%) was the most prevalent component of metabolic Syndrome followed by low HDL(53.8%), high BP(51%), hypertriglyceridemia (44.2%) and abnormal FBS (39.4%). Waist circumference, FBS,BP, triglycerides were significantly higher and HDL was significantly lower in postmenopausal women with metabolic Syndrome. Maximum correlation of MS was found with FBS (odds ratio - 11.56) and least correlation was found with blood pressure (odds ratio - 2.679).*

Conclusion: *The prevalence of metabolic Syndrome was high in our study. The components of metabolic Syndrome such as waist circumference, FBS, blood pressure, triglycerides were significantly raised and HDL levels were significantly reduced in post menopausal women with metabolic Syndrome. Such a high prevalence of metabolic Syndrome in postmenopausal women is an alarming sign. Lifestyle changes, early detection and treatment of elevated fasting blood glucose, hypertension and hyperlipidemia are necessary for prevention of cardiovascular diseases in women reaching menopause.*

Keywords: *metabolic Syndrome, menopause.*

Introduction

Metabolic Syndrome (MS) is described by the clustering of several risk factors for cardiovascular disease (CVD) such as hypertension, dyslipidemia, obesity (particularly central obesity), insulin resistance, and high fasting plasma glucose[2]. The menopausal state may be a potential risk factor for the development of metabolic Syndrome as its prevalence has been reported to increase after the attainment of menopause [1]. The declining level of estrogen and alteration of its ratio with testosterone has been implicated as a causal factor for the emergence of metabolic Syndrome at menopausal transition[3]. But there are also direct effects of estrogen deficiency on body fat distribution (central obesity), insulin action, the arterial wall, and fibrinolysis that may influence cardiovascular risk.

Metabolic Syndrome (MS) has been demonstrated as a common precursor to the development of type 2 diabetes and cardiovascular disease (CVD) as well as a risk factor for all cause mortality.

Accumulation of excess abdominal fat with transition through the menopause plays a central role in connecting the metabolic Syndrome with the metabolic alterations of menopause. Therefore to prevent cardiovascular diseases there is a need to evaluate the occurrence of metabolic Syndrome and its components from the time of the menopause. Understanding of these metabolic changes with menopause will aid in the recognition and treatment of women at risk for future CVD, leading to appropriate interventions.

Definition criteria for Metabolic Syndrome

Modified National cholesterol Education Program Adult Treatment Panel III [NCEP ATP III criteria [4] (Waist circumference-Ethnic Specific)

Three or more of the following:

A Central obesity: Waist circumference ≥80cm in women, ≥90cm in men (For South Asians)

b. Hypertriglyceridemia: Serum triglycerides level ≥ 150mg/dL or specific medication

c. Low HDL Cholesterol <50mgldl for women, <40 mg/dL for men or specific medication

d. High blood pressure: SBP ≥ 130mmHg and /or DBP ≥ 85mmHg or on treatment for hypertension

e. High fasting glucose: Serum glucose level ≥ 100 mg/dL or on treatment for diabetes (type2)

Aims and Objectives of the study:

To determine the frequency of metabolic Syndrome in postmenopausal women and to evaluate the components of metabolic Syndrome in post menopausal women.

Materials and Methods

A Cross-sectional study was conducted in 104 postmenopausal women visiting general medicine department at Siddhartha medical college and research centre, Tumkur. Over a period of 24 months.

Inclusion Criteria

Postmenopausal women willing to give consent to participate in the study

Exclusion Criteria

Surgical menopause, patients on hormone replacement therapy, known Diabetic or Hypertensive before the onset of menopause, patient on lipid lowering medication, history of Ischemic heart disease.

Methods of collection of data

Post menopausal women who had at least 1 year history of cessation of menses were included after taking written informed consent. This was followed by thorough clinical examination, anthropometry and investigations (Body height, Body weight, Waist circumference (WC) in centimetre, Body Mass Index (BMI), Lipid profile, Fasting blood sugar, Blood pressure)

Post Menopausal women were considered to have metabolic Syndrome if they have any three or more of the features according to the modified ATP III Criteria[4]

a) Abdominal obesity: waist circumference >80cm

b) Hypertriglyceridemia: serum triglycerides level >150mg/dl

c) Low HDL-cholesterol :<50mg/dl
d) High blood pressure: SBP >130mmhg and /or DBP >85 mm hg or on treatment for hypertension
e) High fasting glucose: serum glucose level > 100mg /dl or on treatment for diabetes

Data was entered in excel sheet and statistical analysis was carried out using SPSS (version 20).To analyze and test data, chi-square test and sample t test was used. P value < 0.05 was considered as statistically significant.

Results

Graph 1 shows the number of postmenopausal women with metabolic Syndrome. Metabolic Syndrome was present in 65(62.5%) post menopausal women and absent in 39 (37.5%) post menopausal women.

Table 1 shows the distribution of components of metabolic Syndrome. Waist circumference >80cm (68.3%) was the most prevalent component of metabolic syndrome followed by HDL <50 mgl dl (53.8%), BP >130/85mmhg (51%), Triglycerides >150mg/dl (44.2%) and FBS >100mg/dl (39.4%)

Table 2 shows the distribution of metabolic Syndrome among postmenopausal women according to age. There was high statistical association found between the age and risk of metabolic Syndrome. Maximum prevalence of metabolic Syndrome was found between 56-60 years and minimum prevalence was between 41-45 years.

Table 3 shows the distribution of metabolic Syndrome according to number of years since menopause. There was high statistical association found between metabolic Syndrome and post menopausal duration. Higher the duration of menopause higher was the risk of Metabolic Syndrome. More number of cases with MS was found in the cases whose postmenopausal duration was between 6-10 years

Table 4 shows the distribution of metabolic Syndrome according to BMI. As BMI increased in postmenopausal women, the proportion of metabolic Syndrome increased.

Table 5 shows the comparison of Age, Age of menopause, Height, Weight and BMI of study group with and without Metabolic Syndrome. In our study the mean age of postmenopausal women with metabolic Syndrome was 55.4±7.27years and without metabolic Syndrome was 52.28±9.94 years. There was no significant difference found (p =0.074) in terms of age between the two groups

Table 6 shows the components of metabolic Syndrome among postmenopausal women.

Table 7 and 8 show the comparision of biochemical profile, waist circumference and blood pressure in postmenopausal women with and without metabolic Syndrome.

Table 1: Distribution of components of metabolic Syndrome

Components of metabolic Syndrome	Number of patients and %
Waist circumference >80cm	71 (68.3%)
HDL <50 mg/dl	56(53.8%)
BP >130/85 mmhg or on treatment for Hypertension	53(51%)
Triglycerides >150mg/dl	46(44.2%)
FBS >100mg/dl or on treatment for diabetes	41(39.4%)

Table 2: Distribution of metabolic Syndrome according to age

Age Group	Metabolic Syndrome		Total
	Absent	Present	
41-45	7(70%)	3(30.0%)	10(100.0%)
46-50	19(54.3%)	16(45.7%)	35(100.0%)
51-55	6(26.1%)	17(73.9%)	23(100.0%)
56-60	1(5.9%)	16(94.1%)	17(100.0%)
>60	6(31.6%)	13(68.4%)	19(100.0%)
Total	39(37.5%)	65(62.5%)	104(100.0%)

Chi-Square: 17.528a; P-value: 0.002

Table 3: Distribution of metabolic Syndrome according to number of years since menopause

Number of years since menopause	Metabolic syndrome		Total
	Absent	Present	
< 2 years	12 (70.6%)	5 (29.4%)	17 (100.0%)
3 - 5 years	14 (63.6%)	8 (36.4%)	22 (100.0%)
6 - 10 years	7 (19.4%)	29 (80.6%)	36 (100.0%)
> 10 years	6 (20.7%)	23 (79.3%)	29 (100.0%)
Total	39 (37.5%)	65 (62.5%)	104 (100.0%)

Chi-Square: 22.857a; P-value: <0.001

Table 4: Distribution of metabolic Syndrome according to BMI

BMI(kg/m^2)	Metabolic syndrome		Total
	Absent	Present	
18.5-22.9	26 (68.4%)	12 (31.6%)	38 (100.0%)
23.0-24.9	12 (41.4%)	17 (58.6%)	29 (100.0%)
25.0-29.9	1 (3.1%)	31 (96.9%)	32 (100.0%)
>=30	0 (0.0%)	5 (100.0%)	5 (100.0%)
Total	39 (37.5%)	65 (62.5%)	104 (100.0%)

Chi-Square: 34.821, P-value: <0.001

Table 5: Comparison of Age, Age of menopause, Height, Weight and BMI of study group with and without Metabolic Syndrome

Parameters	Women with Metabolic Syndrome (65) (Mean±S.D)	Women without Metabolic Syndrome (39) (Mean±S.D)	Mean Difference	P-value
Age	55.34 ± 7.27	52.28 ± 9.94	-3.06	0.074
Age of Menopause	45.43 ± 2.3	45.38 ± 2.65	-0.05	0.926
Height	154.25 ± 5.81	154.95 ± 4.61	0.70	0.522
Weight	61.23 ± 8.55	52.49 ± 5.63	-8.74	<0.001
BMI	25.68 ± 2.67	21.82 ± 1.81	-3.86	<0.001

Table 6: Components of Metabolic Syndrome

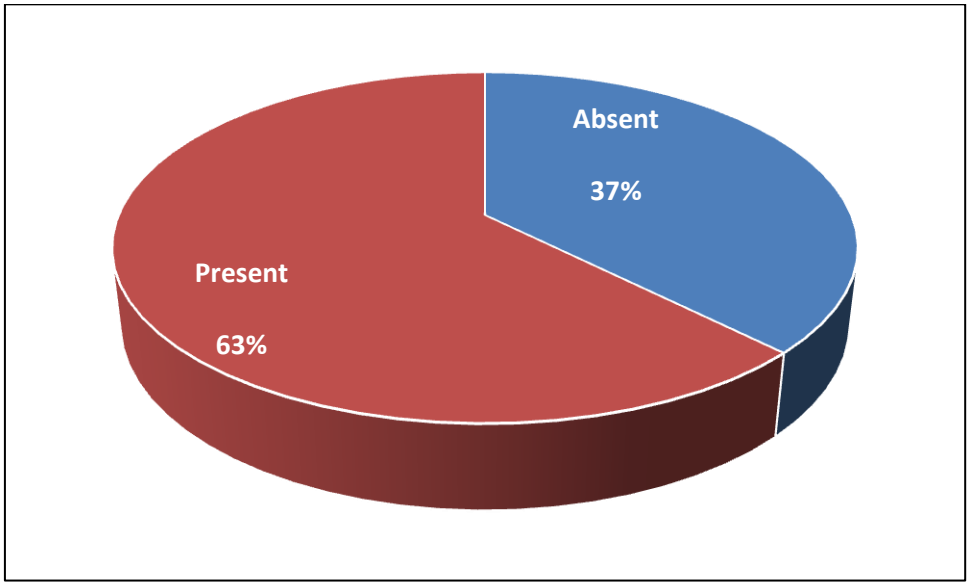
Components of metabolic Syndrome	Metabolic Syndrome		Total	OR(odds ratio)	95% CI	P-Value
	Absent	Present				
Waist circumference						
< 80cm	23(59.0%)	10(15.4%)	33(31.7%)	7.91	3.13 - 19.99	<0.001
> 80cm	16(41.0%)	55(84.6%)	71(68.3%)			
FBS or Diabetic on medication						
<100mg/dl	35(89.7%)	28(43.1%)	63(60.6%)	11.56	3.68 - 36.34	<0.001
>100mg/dl	4(10.3%)	37(56.9%)	41(39.4%)			
BP or hypertensive on Rx						
<130/85	25(64.1%)	26(40.0%)	51(49.0%)	2.679	1.18 -6.09	0.025
>130/85	14(35.9%)	39(60.0%)	53(51.0%)			
Triglycerides						
<150mg/d	32(82.1%)	26(40.0%)	58(55.8%)	6.86	2.64 - 17.85	<0.001
>150mg/d	7(17.9%)	39(60.0%)	46(44.2%)			
HDL						
>50mg/dl	26(66.7%)	22(33.8%)	48(46.2%)	3.91	1.69 - 9.06	0.002
<50mg/dl	13(33.3%)	43(66.2%)	56(53.8%)			
Total	**39 (100.0%)**	**65 (100.0%)**	**104 (100.0%)**			

Table 7: Biochemical Profile

Laboratory Parameters	Women without Metabolic Syndrome (39) (Mean±S.D)	Women with Metabolic Syndrome (65) (Mean±S.D)	Mean Difference	P-value
FBS(mg/dl)	91.13 ±10	112.18 ±30.94	-21.06	<0.001
Triglycerides	133.92 ±39.26	168.85 ±74.05	-34.93	0.008
HDL	53.36 ±11.96	47.98 ±9.49	5.38	0.013

Table 8: Waist circumference and Blood pressure measurement

Clinical Parameters	Women without Metabolic Syndrome (39) (Mean±S.D)	Women with Metabolic Syndrome (65) (Mean±S.D)	Mean Difference	P-value
Waist circumference	79.69 ± 7.08	89.22 ± 8.04	-9.52	<0.001
SBP	123.59 ±16.21	131.88 ±16.91	-8.29	0.016
DBP	79.54 ±9.67	84.8 ±11.21	-5.26	0.017



Graph 1: Number of postmenopausal women with metabolic syndrome

Discussion

Age and Metabolic Syndrome

The mean age of post menopausal women in our study was 54.19±8.454 years and the mean age of menopause was 45.41±2.428 years. Metabolic Syndrome was found to be maximum in the women between the age group of 56-60 years (table 2) and who were 6-10 years postmenopausal. (Table 3). In a study conducted by Jeyasheela k et al[5] and Jouyandeh k et al[6], the mean age of subjects was comparable to our results

Prevalence of metabolic Syndrome

The prevalence of metabolic Syndrome in our study was 62.5% using modified ATP III criteria. Our findings were consistent with studies conducted by Pandey S et al[7], Sharma S et al[8], Heidari R et al[9], Figueiredo et al [10] where postmenopausal women were found to be at higher risk of MS than premenopausal women.

A cross-sectional study Gorgan province in Iran showed a prevalence of 30% in postmenopausal women[11] ,the studies conducted by Tandon VR et al[12] (India), Janssen I[13],(US), Ruan X[14](China) showed a prevalence of 13% ,13.7% and 33.7% respectively which is in contrast to our findings.

Components of metabolic Syndrome

In a study conducted by Jeyasheela K et al[5] dyslipidemia was observed in nearly 83% of study subjects followed by abnormal FBS (59.7%) and hypertension (50.6%).

In a study conducted by Jouyandeh et al[6] in Tehran, the percentage of fasting blood sugar>110 mg/dl, high density lipoprotein<50 mg/dl, Triglyceride≥150 mg/dl, waist circumference≥88 cm, and systolic blood pressure ≥130 mmHg/diastolic blood pressure≥85 mmHg in postmenopausal women were 29.1%, 35.6%, 35.6%, 64.3%, 47.9% respectively which can be compared to our results.

Waist circumference and metabolic Syndrome

In a study conducted by Jayasheela k et al[5] the mean waist circumference of women with and without metabolic Syndrome was 95.63±9.32cm and 86.35±13.95cm respectively. The prevalence of abdominal obesity in a study conducted by Jouyandeh et al[6] was 64.3% which can be compared to our results.

FBS and metabolic Syndrome

The prevalence of abnormal FBS in our study was 39.4%. Postmenopausal women with metabolic Syndrome had significantly higher fasting blood sugar levels when compared to women without metabolic Syndrome (p<0.001)

The prevalence of abnormal FBS in studies conducted by Jesmin S et al[15] and Marjani et al [11]was 49.64% and 17% respectively.

Blood pressure and Metabolic Syndrome

In our study**,** the prevalence of BP>130/85mmhg was 51%. In a study conducted by Jayasheela K et al[5], post menopausal women with metabolic Syndrome had significantly higher systolic blood pressure (p=0.002) when compared to women without metabolic Syndrome. However there was no difference in diastolic blood pressure between two groups. There was a high prevalence of hypertension in our study and the study conducted by Jayasheela K et al[5], Jouyandeh et al[6] and Marjani et al[11].

Lipid profile and metabolic Syndrome

The prevalence of hypertriglyceridemia in our study was 44.2 % and the prevalence of low HDL in post menopausal women was 53.8%.There was significant association between dyslipidemia and metabolic syndrome (table 6 and table 7)

In a study conducted by Jeyasheela K et al, there was no significant association between dyslipidemia and metabolic Syndrome, but there was significant association between dyslipidemia and metabolic Syndrome in a study conducted by Marjani et al.

Limitations of the study

1) It is not a case control study:
2) Criteria used to define metabolic Syndrome- There are different criterias used to define metabolic Syndrome.

Conclusion

The prevalence of metabolic Syndrome was high in our study. The components of metabolic Syndrome such as waist circumference, FBS, blood pressure, triglycerides were significantly raised and HDL levels were significantly reduced in post menopausal women with metabolic Syndrome. Such a high prevalence of metabolic Syndrome in postmenopausal women is an alarming sign. Prevention through c lifestyle changes or early detection and treatment of elevated fasting blood glucose, hypertension and hyperlipidemia are necessary for prevention of cardiovascular diseases in women reaching menopause. Post menopausal should be considered as a major target group for prevention of metabolic Syndrome.

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