Original Research Article

Prevalence of Metabolic Syndrome in Post Menopausal Females (An Observational Study)

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A study regarding prevalence of metabolic syndrome in post-menopausal females (Observational Descriptive Study)

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Introduction:

Menopause is defined as permanent cessation of menstruation following the loss of ovarian activity. Metabolic syndrome is cluster of metabolic abnormalities characterised by abdominal obesity, hyperglycaemia, decreased high density lipoprotein, increased triglycerides and high blood pressure, which predispose the individual for both cardiovascular diseases and type 2 diabetes. Some studies have shown a causal relationship between menopause and the risk that compose the metabolic syndrome, while others attribute the increase in risk only to the aging process.

Aims & Objectives:

Thus, this study was done to determine the prevalence of metabolic syndrome in postmenopausal female.

Material & Methods:

The present study was done in postmenopausal females presenting in menopause clinic at Govt. Medical College and Rajindra Hospital, Patiala   for a period of one year from January 2017 to December 2017. The parameters of metabolic syndrome were assessed according to Modified ATP lll (2005) criteria.

Results:

A total of 190 postmenopausal females were enrolled during study period. The mean age of the study subjects was 59.88±7.99years. It was observed that mean values of all components of metabolic syndrome in our study population were above the cut off levels given by Modified ATPIII Criteria. This corroborates the high prevalence of all components of metabolic syndrome in our study. In study subjects, blood pressure (87.89%) presented the highest prevalence followed by elevated waist circumference (68.95%), elevated fasting blood sugar or DM (62.10%), elevated triglycerides (49.47%) and low HDL (41.05%). The prevalence of metabolic syndrome among our study subjects was 67.89%.

Conclusion:

The prevalence of MS is very high in this part of India, and this can be attributed to the higher prevalence of hypertension& obesity in the people in North India. There is an urgent need to establish magnitude of the problem and incorporate management prevention strategies within the existing health infrastructure.

Key words:

menopause, post-menopausal, metabolic syndrome

Introduction

Menopause is defined as permanent cessation of menstruation following the loss of ovarian activity. It is said to be attained after absence of menstruation for 12 months following last menstrual period. The years prior to menopause that encompasses the change from normal ovulatory cycles to cessation of menses is called premenopausal transitional years.[1]

Metabolic Syndrome (MS) predisposes to early organ damage, such as left ventricular hypertrophy,

microalbuminuria, increased stiffness of arteries, thickening of the intima-media carotid arteries and impaired endothelial function. It also enhances the prothrombotic state, which increases the risk of venous thrombosis and/or pulmonary embolism.[2]

Some studies have shown a causal relationship between menopause and the risk that compose the metabolic syndrome, while others attribute the increase in risk only to the aging process.[3]

Thus, Metabolic syndrome is cluster of metabolic abnormalities characterised by abdominal obesity, hyperglycaemia, decreased high density lipoprotein, increased triglycerides and high blood pressure, which predispose the individual for both cardiovascular diseases and type 2 diabetes.[4,5]

NCEP ATP III (2001) Definition

In 2001, the National Cholesterol Education Program Adult Treatment Panel III (ATP III) [5,7] proposed that the metabolic syndrome be introduced into clinical practice as a risk companion to elevated LDL cholesterol (LDL-C). The concept of the syndrome presented in ATP III was based on more than 2 decades of research on the clustering of metabolic risk factors.

According to this definition, a subject has the MS if he or she has three or more of the following criteria:
1. Abdominal obesity: WC ≥102 cm in men and ≥88 cm in women
2. Hypertriglyceridemia: ≥150 mg/dl (1.695 mmol/l)
3. Low HDL-C: <40 mg/dl in men and <50 mg/dL in women
4. High blood pressure (BP): >130/85 mmHg
5. High fasting glucose: >110 mg/dL

International Diabetes Federation Global Consensus Definition

The International Diabetes Federation (IDF) released a global consensus definition (2005) for MS, along with race- and gender specific Waist circumference (WC) cut-offs. This definition identified central obesity as an essential component of MS and defined MS as central obesity (based on race- and gender-specific WC cut-offs) plus any two of the following four parameters: [6]
1. Raised triglycerides: ≥150 mg/dl (1.7 mmol/l) or history of specific treatment for this lipid abnormality
2. Reduced HDL cholesterol: <40 mg/dl (1.03 mmol/l) in males and < 50 mg/dl (1.29 mmol/l)

in females or history of specific treatment for this lipid abnormality
3. Blood pressure: systolic BP ≥130 mm Hg or diastolic BP ≥85 mm Hg or on treatment for previously diagnosed hypertension
4. Raised FPG: ≥ 100 mg/dL or previously diagnosed type 2 DM

Modified ATPIII Criteria (2005) Definition

In 2004, ADA lowered the fasting plasma glucose threshold used to identify individuals with IFG from 110 mg/dl to 100 mg/dl.[8] Subsequently, the NCEP ATP III has also suggested that the fasting plasma glucose concentration for diagnosing MS be lowered to 100 mg/dl. Thus, ATP III criteria for diagnosis of metabolic syndrome was updated by the National Heart, Lung, and Blood Institute (NHLBI) and the American Heart Association (AHA). ATP lll criteria (2005) [9] is defined as below (any 3 of the 5 criteria below constitute a diagnosis of metabolic syndrome);
1. Elevated waist circumference≥102 cm (≥40 inches) in males or ≥88 cm (≥35 inches) in females
2. Elevated triglycerides≥150 mg/dL (1.7 mmol/L) or on drug treatment for elevated triglyceride
3. Reduced HDL cholesterol <40 mg/dL (0.9 mmol/L) in males or < 50 mg/dL (1.1 mmol/L) in females or on drug treatment for reduced HDL-C
4. Elevated blood pressure ≥130 mm Hg systolic blood pressure or ≥85 mm Hg diastolic blood pressure or on drug treatment for hypertension
5. Elevated fasting glucose≥100 mg/dL or on drug treatment for elevated glucose.

These criteria represent only minor modifications of the original ATP III report. Waist circumference thresholds are the same except that it is noted that lower thresholds are appropriate for persons who have clinical evidence of insulin resistance or who are members of ethnic groups in which the prevalence of insulin resistance is high. No changes were made in cut points for triglycerides or HDL-C; but when individuals are on lipid-lowering drugs for these risk factors they can be considered to have these risk factors. An elevated blood pressure is defined as a systolic blood pressure≥130 mm Hg or diastolic blood pressure ≥85 mm Hg or on drug treatment for hypertension.

RECOMMENDED APPROACH FOR MANAGEMENT OF METABOLIC SYNDROME

ATP III recommends active lifestyle approach to reducing risk for CHD. This approach is designated

therapeutic lifestyle changes (TLC) and includes the following components.[5]
• Reduced intakes of saturated fats and cholesterol
• Therapeutic dietary options for enhancing LDL lowering (plant stanols/sterols and increased viscous soluble fibre)
• Weight reduction
• Increased regular physical activity

Physical activity includes enough moderate exercise to expend at least 200 kcal per day. Recommendation is of 30 minutes of regular moderate intensity activity on most, if not all, days of the week.

ATP III recommendations for ranges of other macronutrient intakes in the TLC Diet are given below

Polyunsaturated fat Up to 10% of total calories
Monounsaturated fat Up to 20% of total calories
Total fat 25–35% of total calories
Carbohydrate 50–60% of total calories
Dietary fibre 20–30 grams per day
Protein Approximately 15% of total calories.
Cholesterol Less than 200mg/day[5]

Thus, this study was done to determine the prevalence of metabolic syndrome in postmenopausal female and lifestyle, diet modification and necessary intervention were advised accordingly.

MATERIALS AND METHODS

The present study was done in postmenopausal females presenting in menopause clinic at Govt. Medical College and Rajindra Hospital, Patiala for a period of one year from January 2017 to December 2017.

Inclusion Criteria:

All post-menopausal females presenting to menopausal clinic

Exclusion Criteria:

1. Patient with serious illness e.g. advanced stage malignancy, chronic renal failure, known cardiovascular disease
2. History of Polycystic ovarian diseases
3. Surgical menopause
4. Not willing to participate in study.

After taking detailed history & examination, parameters of metabolic syndrome were assessed according to Modified ATP lll (2005) criteria:

1. Abdominal obesity: waist circumference≥ 88 cm
   Using a flexible metric tape the waist circumference (in centimetres) was assessed at a point midway between the lowest rib margin and the top of the iliac crest with the subject standing.
2. Serum TG level ≥ 150 mg/dl or on treatment for raised triglycerides.
3. Serum HDL: <50 mg/dl
4. High blood pressure: SBP ≥ 130 mmHg and/or DBP ≥ 85 mmHg or on treatment for hypertension Blood pressure was measured with a standard electronic LCD bar sphygmomano-meter, applied to the right arm after 15 minutes of rest in the sitting position. An appropriate adult cuff was applied 2 to 3 cm above the antecubital fossa of the right arm. The systolic and diastolic blood pressures were read at appearance of first and disappearance of fifth Korotkoff sounds respectively.
5. High fasting glucose: serum glucose level >100mg/dl or on treatment for diabetes mellitus. Venous sample was taken after 8 hours of fasting.

RESULTS

A total of 190 postmenopausal females were enrolled during study period. The study was analysed using IBM SPSS-21 version. (Statistical package for social science) The following observations were noted.

The mean age of the study subjects was 59.88±7.99years. Overall the age of the study subjects ranged from 41– 80 years. It was found that mean duration of menopause in study subjects was10.16±5.78years.

There was almost equal distribution of study subjects according to demographic area of residence in our study.

In the study subjects, the most common menopausal complaint was Urogenital Symptoms 132 (69.47%) followed by Mood Disturbance 126 (66.32%), Memory Loss 123 (64.74%), Hot Flushes 103 (54.21%) and Depression 109 (57.37%).

Table 1: Mean values of all components of Metabolic Syndrome according to Modified ATP III Criteria in study subjects

Components of metabolic syndrome	Mean	SD	Range
SBP ≥130 mmHg	131.81	±18.71	102 -162mmHg
DBP ≥85 mmHg	87.06	±10.89	68 -106mmHg
WC ≥88 cm	90.39	±6.50	85 -113cm
FBS ≥100 mg/dL	112.34	±24.19	72 -162mg/dL
HDL ≤50 mg/dL	49.74	±12.22	28 -71mg/dL
S. TG ≥150 mg/dL	152.49	±21.99	110 -270mg/dL

It was observed that mean values of all components of metabolic syndrome in our study population were above the cut off levels given by Modified ATPIII Criteria. This corroborates the high prevalence of all components of metabolic syndrome in our study. (Table1)

Table 2: Prevalence of the various components of Metabolic Syndrome according to Modified ATP III Criteria

Components of metabolic syndrome	No of subjects	Percentage
On treatment for HTN or elevated BP (BP ≥130 / 85mmhg)	166	87.89%
WC ≥ 88cm	131	68.95%
On treatment for DM or elevated FBS ≥100mg/dL	118	62.10%
On treatment for low HDL or low HDL ≤50mg/dL	78	41.05%
On treatment for elevated TG or elevated TG ≥150mg/dL	94	49.47%

In study subjects, blood pressure (87.89%) presented the highest prevalence followed by elevated waist circumference (68.95%), elevated fasting blood sugar or DM (62.10%), elevated triglycerides (49.47%), low HDL (41.05%). (Table 2)

Fig 1: Showing the prevalence of number of criteria of Metabolic Syndrome among study subjects using Modified ATP III Criteria

Fig 2: showing the prevalence of Metabolic Syndrome according to Modified ATP lll Criteria
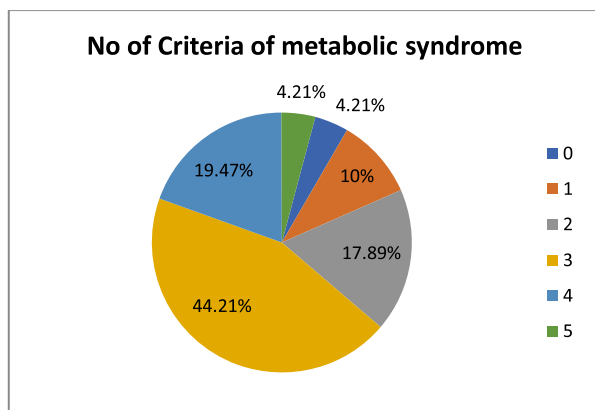
The majority of subjects 84 (44.21%) fulfil 3 criteria of metabolic syndrome followed by 37(19.47%) subjects having 4 criteria, 34(17.89%) subjects having 2 criteria, 19(10%) subjects having 1 criterion, 8 (4.21%) subjects having 5 criteria of metabolic syndrome. It was also observed that 8(4.21%) subjects didn't fulfil any criteria of metabolic syndrome. (Fig 1)
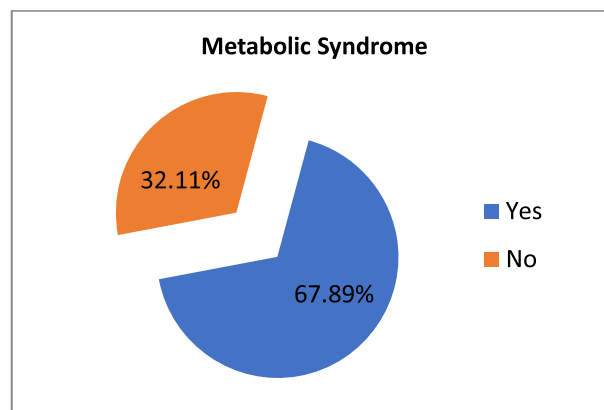
A total of 190 subjects were enrolled in present for a period of one year. Out of 190 women,129 (67.89%) study subjects were diagnosed to have metabolic syndrome as they fulfilled ≥3 criteria of metabolic syndrome according to Modified ATP lll Criteria. Thus, Total prevalence of metabolic syndrome among our study subjects was 67.89% (Fig 2)

DISCUSSION

We compared the prevalence of metabolic syndrome in post-menopausal females & its various criteria to various Indian and International studies

The present study is comparable to study by Figueiredo Neto et al. (2010) [10] in relation to prevalence of four &five components of metabolic syndrome but reported more prevalence of three components in his study. Other studies done by Marjani Aet al(2012), [11] Raczkiewicz D et al (2017) [12] and Randhawa et al (2015) [13] reported different percentage of number of components of metabolic syndrome in their studies. This could be attributed to different study design, number of cases, different criteria used for definition, type of menopause (natural/surgical) and level of physical activity in studied population.

The variable prevalence of different components of metabolic syndrome was seen in different studies. In present study, blood pressure (87.89%) was most prevalent component followed by elevated waist circumference (68.95%), elevated fasting blood sugar or DM (62.10%), elevated triglycerides (49.47%), low HDL (41.05%). This is partly in agreement with the study by Hidalgo LA et al. (2006)[14] and María Pilar et al (2015) [15] who found the higher prevalence of hypertension & waist circumference followed by high triglyceride, low HDL, hypertension and diabetes.

The present study is also in agreement with the study by S. Kim et al (2008), [16] Marchi Ret al (2018),[1] and Soumi Srimani et al (2017) [18] who also reported higher prevalence of hypertension in their studies. In a study done by Zehra jayounde et al (2013) [19] elevated fasting blood sugar was found to be most prevalent factor followed by hypertension, low HDL, high triglyceride and elevated waist circumference in the descending order. Our study was in contrast to the study by Jesmin et al. (2013) [20] in which they found the maximum prevalent component to be low HDL (76.8%), followed by hypertension, diabetes (49.6%), triglycerides (38.12%), and waist circumference (8.6%). The overall higher prevalence of different components of MS in the current study can be explained by a possible significant effect of age group (41–80years) and the place of study (tertiary health-care centre)

In present study, postmenopausal women had significantly higher mean values of all components of metabolic syndrome which is comparable to Heidari R et al (2010) [21] and Randhawa et al (2015). [13]

Table 3: Comparison of prevalence of Metabolic Syndrome in Indian studies

Author and year of study	Area	Criteria Used	No. of cases	Percentage prevalence
Randhawa et al (2015)[13]	Amritsar, Punjab	ATP -III, IDF mATP -lll	114	21.66 % 24.33% 25.66 %
Sandeep Sharma et al (2015)[22]	North India	mATP -Ill	175	62.6
Sinha N et al (2016)[29]	Hyderabad	IDF	53	50.9
Soumi Srimani et al (2017)[18]	WestBengal	mATP -Ill	509	35
Jeyasheela K et al (2018)[23]	Tamil Nadu	IDF	154	64
Tandon et al (2010)[25]	Jammu & Kashmir	mATP -Ill	500	13
Pandey et al (2010)[24]	Western India	mATP -Ill	681	55%
Presentstudy (2018)	Patiala,Punjab	mATP -Ill	190	67.89%

Most of the authors as Sandeep Sharma et al (2015), [22] Jeyasheela K et al (2018),[23] and Pandey et al (2010) [24] reported high prevalence of metabolic syndrome in post-menopausal females which is in agreement to our study.

The least prevalence of metabolic syndrome was seen in study done by Tandon et al. (2010) [25] in Jammu & Kashmir which may be due to active lifestyle in post-menopausal females in hilly areas. (Table3)

These differences in prevalence of metabolic syndrome in different studies could be attributed to selection bias (community/hospital-based groups), the type of menopause (natural/surgical), socioeconomic and environmental differences, different criteria used for definition, study design and sample size.

Table 4: Comparison of prevalence of Metabolic Syndrome in International studies

Author and year of study	Area	Criteria Used	No. of cases	Percentage prevalence
S. Kim et al (2008)[16]	Korea	m ATP III	778	54.6%
Figueiredo Neto et al (2010)[10]	Argentina	m ATP III IDF.	124	34.7% 22%
N. Maharlouei et al (2012)[27]	Iran	m ATP Ill	434	60.2%
Marjani A et al (2012)[11]	Gorgan, Iran	ATP III	100	31%
Zehra jayounde et al (2013)[19]	Tehran	ATP III	940	53.5%
Alina Shri Sapkota et al(2015)[28]	Nepal	IDF	90	57.8% ,
Damaris Enyegue Mandob et al(2015)[26]	Africa	m ATP III	206	16.5%
Marchi R et al(2018)[17]	Brazil	ATP III	323	44.4%
Hidalgo LA et al. (2006)[14]	Ecuador		325	41.5%
Present study (2018)	Patiala, Punjab, India	m ATP III	190	67.89%

Prevalence of MS among menopausal women varies greatly in different populations. It ranges from 16.5% in (Yaounde) Africa done by Damaris Enyegue Mandob et al (2015) [26] to 60.2% in Iran by N. Maharloueiet al(2012) [27]. These differences are probably related to ethnic variations, genetic factors and lifestyle, different criteria used for definition, study design and sample size. (Table 4)

Asian have a high prevalence of MS as shown by studies done by S. Kim et al(2008), [16]N. Maharloueiet al (2012), [27] Zehra jayounde et al (2013), [19] Alina Shri Sapkota et al (2015) [28] in Korea, Iran, Tehran and Nepal using the same Modified ATP Ill criteria which are comparable to present study. However, contrary findings were documented from other studies too. Studies among catholic health care centre in urban Cameroon (Yaounde) Africa and Italy showed that the

prevalence of MS among postmenopausal women lower i.e. 16% and 37.1% respectively. (Table 4) These could be due to genetic characteristic which is responsible for lower prevalence of abdominal adiposity and MS in these countries

CONCLUSION

The prevalence of MS is very high in this part of India, and this can be attributed to the higher prevalence of hypertension & obesity in the people in North India.

This study highlights the high prevalence of MS among postmenopausal women which could increase the burden of diabetes and CVDs in near future in Punjabi population. If the present trend continues, the situation can get worse even within a decade and MS and its associated diseases can emerge as important public health problem. There is

an urgent need to establish magnitude of the problem and incorporate management prevention strategies within the existing health infrastructure.

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