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PREVALENCE OF METABOLIC SYNDROME IN URBAN MIDDLE AGED WOMEN

Medical Science

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ABSTRACT

Background: Metabolic syndrome includes abdominal obesity measured by waist circumference, increased blood pressure, fasting glucose, triglycerides and reduced high density lipoprotein-cholesterol (HDL-C). Higher prevalence of metabolic syndrome in middle aged women has been reported. The prevalence of the metabolic syndrome differs greatly in different populations. So the present study was planned to determine the prevalence of metabolic syndrome in pune urban middle aged women **Methods:** Depending on menstrual history total 300 pre, peri and postmenopausal women were included (100 in each group) in the study. Clinical identification of the metabolic syndrome was done as per the joint interim statement. ANOVA (Analysis of Variance) and chi square test were used for comparison between three groups. **Results :** Mean levels & percentage of WC, blood pressure, FBG and TGs were higher in peri & highest in postmenopausal women as compared to premenopausal women. HDL cholesterol levels were lower than normal and similar in all three groups. In the present study 29%,65%,69% was the prevalence of metabolic syndrome in pre ,peri and postmenopausal group respectively. **Conclusion :** Mets prevalence was maximum in postmenopausal women. WC ,Blood pressure and triglycerides were the predominant components of Mets. Postmenopausal women were less physically active therefore lifestyle modifications such as increase in physical activity and reduced caloric intake is likely to alter the prevalence of Mets.

KEYWORDS:

Introduction

Metabolic syndrome includes abdominal obesity measured by waist circumference, increased blood pressure, fasting glucose, triglycerides and reduced high density lipoprotein-cholesterol (HDL-C).[1]

The prevalence of metabolic syndrome is increasing in developing countries, especially in the South Asian countries [2,3]. Furthermore, the prevalence is reported to be higher in Indian urban women. It has been shown to be associated with older age, changes in life style, dietary patterns and socioeconomic status. [3-7] It is further attributed to fluctuating or deficient levels of estrogen which increases central obesity raising the risk of metabolic syndrome and cardiovascular diseases. [8,9]

The prevalence of the metabolic syndrome differs greatly in different populations. However, to the best of our knowledge less work [10.] has been conducted in Maharashtra regarding prevalence of metabolic syndrome. This study, therefore, sought to determine the prevalence of metabolic syndrome in the urban middle aged women.

Methods:

Study design

This study was an observational cross-sectional study. A written informed consent was taken after ethical committee approval from institutional ethics committee (BVDU/MC/42).This study was conducted in Bharati Vidyapeeth University Medical College and Hospital, Pune. We anticipated the prevalence of metabolic syndrome as 46.5%. Based on this with a relative precision of 9% with 95% confidence level and power of 80%, we arrived at the sample size of 241. Anticipating for refusals and dropouts we enrolled 300 women (100 in each group). Women were classified as premenopausal (Group I, n = 100) having regular menstrual periods; perimenopausal (Group II ,n = 100) women with irregular menstrual periods i.e more than 2-3 months and postmenopausal (Group III, n = 100) (if absence of menstrual periods for 12 consecutive months and thereafter , irrespective of surgical or natural menopause . Subjects with morbid conditions like diabetes, hypertension, ischemic heart disease, cancer , thyroid disease, any other acute or chronic liver , kidney disease , subject who underwent hysterectomy and any current infectious condition were excluded from the study .

According to joint interim statement of the IDF , using the IDF global consensus definition [11] presence of three or more of the following five parameters was considered as diagnostic of metabolic syndrome .

1	Abdominal obesity by waist circumference
	Men ≥ 90 cm Women ≥ 80 cm
2.	Triglyceride ≥ 150 mg/dL
3	High-density lipoprotein cholesterol
	Men < 40 mg/dL Women < 50 mg/dL
4	Blood pressure ≥ 130/85 mm Hg
5	Fasting glucose ≥100 mg/dL

For physical activity those women who achieved the recommended 150 minutes of moderate level physical activity a week were labelled as physical active.[12]

Sample collection and processing

All women volunteers were asked to come to the hospital . Information regarding age, socioeconomic status , education ,occupation , diet , physical activity and type of family were taken . Blood was collected by venipuncture of median cubital vein in the antecubital fossa with aseptic precautions. Fasting blood sample (10 ml) was collected after an overnight fast in the morning (7:00–8:00 A.M.). The plasma and serum were separated and stored at -80°C.Fasting plasma glucose was assessed by GOD-POD (mg/dl) and HDL and TGs were assessed by using commercial kit. Data is represented as mean (standard deviation). SPSS version 17.0 for Windows (SPSS Inc, Chicago) was used for the statistical analysis. ANOVA (Analysis of Variance) and chi square test were used for comparison between three groups. p value of

less than 0.05 was considered as significant difference.

Results:

Table: 1
Demographic Profile in all 3 study group

	Group I (Premenopausal)	Group II (Perimenopausal)	Group III (Postmenopausal)	p for chi squa
	N=100	N=100	N=100	
Income class				
Lower middle	41	49	70	0.000
Middle	59	51	30	
Education				
Non graduate	41	56	84	0.000
Graduate	59	44	16	
Family				
Joint	21	42	52	0.000
Nuclear	79	58	48	
Occupation				
Housewife	80	82	90	0.12
Employed	20	18	10	
Diet				
Vegetarian	53	47	64	0.05
Mixed	47	53	36	
Physical Activity 150 min /wk	129 (70.77)	137.1 (94.8)	111.6 (78.51)	> 0.05

Mean (SD) in %

Baseline characteristics of premenopausal, perimenopausal and postmenopausal women were shown in Table 1. In postmenopausal women maximum number of volunteers were in lower middle class income , non graduate , belonging to joint family , housewives and vegetarians .

Table :2

Anthropometry measurements in the three groups

	Group I (Premenopausal) N=100	Group II (Perimenopausal) N=100	Group III (Postmenopausal) N=100
Age (y)	39.8 (3.5)	45 (3.74) [a]	52.9 (5.8) [a b]
Height (cm)	155.3 (5.5)	154.3 (5.6)	152.3 (5.5)
Weight (Kg)	62.3 (9.4)	64.1 (9.2)	63.8 (11.7)
BMI (Kg/m^2)	25.9 (3.7)	26.9 (3.6) [a]	27.5 (4.9)
Waist (cm)	80.1 (9.8)	82.6 (8.4) [a]	84.0 (13.20)
Hip (cm)	102.9 (9.8)	105.3 (10.0)	106.9 (12.5)
Waist-Hip ratio	0.78 (0.09)	0.79 (0.07)	0.79 (0.09)

Mean (sd)

[a] Different from group I p <0.05,[b] Different from group II p <0.05

Table 2 showed that postmenopausal women were older , shorter & perimenopausal women were with significantly higher BMI and waist circumference than premenopausal women .

Table: 3
Prevalence of Metabolic syndrome and its components

	Group I (Premenopausal) N=100	Group II (Perimenopausal) N=100	Group III (Postmenopausal) N=100
Waist (cm)	80.1 (9.8)	82.6 (8.4)	84.0 (13.2)
Obese (≥ 80)	45	65[a]	72[a]
Blood pressure (mmHg)			
Systolic	124 (13)	129 (14)	137 (17)
≥130	32	55[a]	66[a]
Diastolic	76 (9)	83 (12)[a]	82 (10)
≥ 85	15	48[a]	40[a]
Systolic ≥ 130 or diastolic ≥ 85	36	62[a]	71[a]
Fasting glucose (mg%)* ≥ 100	93 (80, 110) 40	102 (90,112) [a] 54[a]	112 (102, 120)[a,b] 82[a,b]
HDL cholesterol (mg%) < 50	44 (2.5) 100	44 (2.5) 100	44 (2.5) 100
Triglycerides (mg%) ≥ 150	102.2 (33.4) 8	100.2 (41.3) 19[a]	114.6 (39.6)[b] 16
Metabolic syndrome	29	65[a]	69[a,b]

Mean (SD) for continuous variable, Median (IQR) for fasting glucose and % for categorical variables. [a] Different from group I p <0.05,[b] Different from group II p <0.05

Mean (SD) for continuous variable, Median (IQR) for fasting glucose and % for categorical variables. [a] Different from group I p <0.05,[b] Different from group II p <0.05

Table 3 shows the comparison of components of metabolic syndrome between all the 3 groups. We found that WC , blood pressure, FBG and TGs were significantly higher in peri & post menopausal women compared to premenopausal women. Mean levels of HDL cholesterol levels were lower than normal and similar in all three groups.

Discussion :

Mean levels of HDL cholesterol (44 ± 2.5 mg %) levels were lower than normal and similar in all three groups. Whereas FBG, WC, blood pressure and TGs were higher in peri & highest in postmenopausal women as compared to premenopausal women. In the present study 29%,65%,69% was the prevalence of metabolic syndrome in pre ,peri and postmenopausal group respectively.

WC was more than normal (> 80 cm) in all three groups and maximum in postmenopausal group (84.0 ± 13.2 cm) . Similar results were obtained by Shefali Pande et al [10], Gupta R et al [13]. But Sapna Goyal et al[14], didn't show a difference in waist circumference as the subjects were from tribal area of North East part of India who might be physically active.

High prevalence of central obesity during menopause is due to diminished estrogen secretion.[15,16] This was further aggravated by less physical activity in postmenopausal group than in pre and perimenopausal group as observed in our study.

Mean values of blood pressure systolic (137 ± 17 mmHg) and diastolic (82 ± 10 mmHg) were higher in postmenopausal group as compared to pre and perimenopausal group. Sapna Goyal et al reported similar result. [14] Visceral fat (central obesity) produces free fatty acids and inflammatory cytokines predisposing postmenopausal women to atherogenic dyslipidaemia leading to arterial stiffness and atherosclerosis culminating in high blood pressure. [17,18]

In the present study FBG was more than normal (> 100 mg /dl) in peri and postmenopausal groups. Similar results were obtained by Sapna Goyal et al [14], Shefali Pande et al . [10] This can be explained by larger waist circumference in postmenopausal women (112 (102, 120) mg /dl) in the present study, as more is the WC more is the impaired fasting glucose . [18,19]

Mean levels of TGs were highest (114.6 ± 39.6 mg %) in postmenopausal groups . Similar results were found in a study by Shefali Pandey et al[10] Sapna Goyal et al [14] Postmenopausal status was associated with a 16% increase in TG. [16] The enzyme cholesteryl ester transfer protein (CETP) balances the levels of TG and HDL-cholesterol. High CETP activity observed in MetS explains the high TG levels and low HDL-C levels. [20,21] as present in our study.

In the present study HDL cholesterol mean levels (44 ± 2.5 mg %) were lower than normal and similar in all three groups. Similar results were obtained by Sapna Goyal et al .[14] Shruti Dasgupta et al [22] with low HDL and with no significant difference between pre and post menopausal women . Various studies commented that Asian Indian women have higher frequency of low HDL independent of age, BMI and menopause status. [23,24] Modification of the HDL-cholesterol cutoff point may be required in women in our populations.

Thus the present study found that proportion of postmenopausal women with low HDL and high FBG, WC ,Blood pressure , , triglycerides was 100 %, 82%72 %,71%, 16% . HDL , FBG WC and BP were the predominant components of Mets in postmenopausal women . Our results do not agree with Gupta et al [13] and Shefali Pande et al [10] (Western India) who found WC, BP and TGs are predominant components of Mets. Our results agree with Sapana Goyal et al. [14] Whereas Asian African and Latin American studies also did not find TGs as a predominant component of metabolic syndrome. The above studies indicated that the most common risk factor was FBG which can not be explained by WC alone as 82% had high FBG whereas only 71 % had high WC therefore there must be factors besides WC determining FBG .

In present study prevalence of Mets was 29 %,65% & 69% in pre ,peri & post menopausal group respectively. Postmenopausal women were having high prevalence of metabolic syndrome. In the similar studies Gupta et al [13] (Western India) reported 30% prevalence of Mets in women using old ATP criteria. Shefali Pande et al [10] (Western India) reported prevalence of Mets as 44 % and 56 % in pre & postmenopausal group respectively . Sapana Goyal et al [14] reported

prevalence of Mets as 10 %, 41%, 46% in pre ,peri postmenopausal group respectively . Shefali Pande et al [10] and Sapana Goyal [14] et al both have used modified ATP criteria .

The difference in the prevalence rate in different countries is based on difference in genetic and environmental factors. Genetic factors include sex, race and ethnicity and family history. Environmental indicators consist of age, socioeconomic status, obesity dietary patterns, physical activity level and educational status . [24,25]

In the present study Mets prevalence was maximum in postmenopausal women. FBG, WC and Blood pressure were the predominant components of Mets. Postmenopausal women were less physically active therefore lifestyle modifications such as increase in physical activity and reduced caloric intake are likely to alter the prevalence of Mets.

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