Original article:

Metabolic syndrome in pre and post menopausal women of Bangladesh

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Abstract

Objective: To assess the metabolic syndrome (MetS) status in pre and post menopausal women of Bangladesh. ***Materials and Methods:*** Secondary analysis from a cross-sectional study on 276 willing females from an urban and a rural area. The socio-epidemiologic factors were studied with anthropometric examination, blood pressure recording and fasting blood for analysis of triglyceride (TG), high density lipoprotein (HDL), fasting blood sugar (FBS) between pre and post menopausal women. ***Results and Discussion***: Only 19.8% premenopausal women had MetS (95% CI=15.7%-24.7%) compared to that of 50% (95% CI=39.9%-60.1%) menopausal (p<0.001). Low HDL cholesterol prevailed in almost 97% respondents in both groups (p=0.12). The menopausal women had higher TG (51.6%, p=0.07), obesity (10.9%, 0=0.004), high FBS (40.6%, p<0.001) and hypertension (HTN, 32.8%, p<0.001) compared to those of (TG 39.3%, obesity 6.1%, high FBS 19.8% and HTN 9.9% respectively) premenopausal women. On logistic regression, HTN (OR=3.8, 95%CI: 1.9-7.7) and high FBS (OR=2.2, 95%CI: 1.1-4.2) produced significantly higher odds of being associated with menopause. Only menopause became significantly associated with MetS (OR=4.3, 95%CI: 23.0-7.9) after adjusted with residence and education of the respondents. ***Conclusion:*** MetS is highly prevalent in post menopausal women in Bangladesh. Women approaching menopause should be brought under health education scheme for awareness of MetS while aging.

Keywords: metabolic syndrome; pre menopause; post menopause; Bangladesh

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Introduction

Menopause is the unavoidable event to conclude reproductive life of women. Now a days more women are passing a longer period of their life after menopause due to increased life expectancy associating an increased risk[1] of metabolic syndrome (MetS). It had been recognized a public health problem[2] involving multiple systems. Defined by different expert bodies[3-6], the criteria of MetS by the Adult Treatment Panel III[4] (ATP III) of National Cholesterol Education Program (NCEP) had been widely used which diagnoses MetS as the presence of 3 of 5 factors namely a) abdominal obesity, determined by waist circumference ≥ 88 cm (35 inch) in women, ≥ 102 cm (40 inch) in men, b) high Triglyceride (TG) ≥ 1.7 mmol/l (150 mg/dl), c) low High Density Lipoprotein (HDL) cholesterol <1.3 mmol/l (50 mg/dl) in women, <1.03 mmol/l (40 mg/dl) in men, d) high Blood Pressure (BP) ≥130/85 mm Hg) high Fasting Blood Sugar (FBS) ≥ 6.1 mmol/l (110 mg/dl).The problem of MetS has been shown a steady increase in all populations mainly with ageing[7-12]. Different factors[13-17] had been identified for the occurrence of MetS including lifestyle, diet, body mass, risky behavior, abdominal obesity, insulin resistance, glucose metabolism, dyslipidemia, increased blood pressure and even non-alcoholic fatty liver. South Asians also showed a considerable proportion of MetS[18-21] including Bangladesh but the study to assess MetS in pre and post menopausal women[22] are scarce. So identifying the community risk for MetS in menopausal women had been chosen an important study to reject the primary null hypothesis that there was no difference of MetS factors between pre and post menopausal Bangladeshi women.

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Materials and Methods

The secondary analysis was done from the cross sectional study[23,24] conducted in 2010 from 276 willing female participants, the sample size being calculated using Power and Sample Size Program software[25]. Bangladesh Medical Research Council (BMRC) provided the ethical clearance. A pre-tested semi structured questionnaire recorded socio-demographic, exercise and knowledge of MetS. Interview preceded anthropometric examination of height, weight, waist circumference and both blood pressure recording (BP). Fasting blood was taken thereafter to measure serum TG, HDL and FBS.

After collection, the data was entered in Microsoft excel sheet followed by necessary correction, editing and coding[26-28] before final entry to statistical software SPSS. The components of metabolic syndrome were categorised by threshold value according to ATP III and MetS was calculated with all possible combination of components. Finally dichotomous variable was created as either having MetS or not after collating all the MetS components.

Univariate analysis of the basic socio-demographic and different factors was done using χ^2 test for categorical data. Mann-Whitney U test was applied for continuous data. The data were presented as proportion and mean±SD as applicable. Logistic regression was done with all the related variables followed by best fit model with the significant variables only. For variable selection of independent effect measurement in logistic regression, we followed the rule[29,30] of minimum number of event or non-event divided number between 10-20, i.e. number of variable inclusion for adjustment of confounding factors. Using the criteria we could include 4-7 variables in a model. Because event was minimum (64 MetS against 212 no MetS) wecould include 4 variables in the equation which would become significant in univariate analysis. Crude odds ratio (OR) of the components of MetS was calculated with menopausal status followed by adjusted OR. Finally Logistic regression was done to on MetS keeping all the significant variables in the model to adjust. Confidence Interval Analysis (CIA) software was used to calculate the 95% confidence interval (CI) for the prevalence of MetS. A p value ≤0.05 was considered statistically significant. The near significant variables with a p value ≤0.1 were also quoted with caution as the power of more than 0.9 was observed in posteriori calculation.

Result

Table 1 gives a baseline information of study respondents. The premenopausal women were 33.89±6.64 years in this study population and the menopausal women were 51.70±8.61 years. The premenopausal women came mostly from urban areas compared to menopausal women who were from rural areas (p=0.04). The menopausal women were mainly illiterate while the pre menopausal women were mostly educated (p=0.02). Otherwise the baseline variables were homogeneously distributed.

Table 1: Baseline characteristics of study respondents[1]

Variables[2]	Pre menopausal	Menopausal	p[3]
Age	33.89±6.64	51.70±8.61	<0.001
Income	65.83±223.93	88.26±362.47	0.50
Hour of exercise	7.48±5.17	9.33±6.53	0.24
Water intake (liter/day)	3.22±1.40	3.20±1.55	0.61
Sleep (hour/day)	6.73±1.69	6.31±2.01	0.17
Area	n (%)	n (%)	
Urban	116 (78.30)	42 (65.63)	**0.04**
Rural	46 (21.70)	22 (34.37)	
Education			
Illiterate	31 (14.62)	19 (29.69)	**0.02**
Some Education	131 (61.79)	35 (54.69)	
Good Education	50 (23.59)	10 (15.62)	
Occupation			
Sedentary	40 (18.87)	17 (26.56)	0.18
Heavy	172 (81.13)	47 (73.44)	

[1]Continuous values are in means and standard deviations (SD), categorical values in frequencies and proportions

[2]Monthly income in USD converted from Bangladesh Taka (BDT: 1 BDT=1/70USD)

[3]p values for continuous variables are based on the nonparametric Mann-Whitney U test; those for categorical variables are based on chi-square test

From the MetS components (Table 2), waist circumference (p=0.004), systolic BP (SBP), diastolic BP (DBP) and FBS were higher (p<0.001) in menopausal than premenopausal women though TG and HDL were similar. The categorical forms of these MetS components were also significantly high in menopausal women except for obesity, TG and HDL. While the components were collated to form MetS dichotomous variable, it was also significantly higher (<0.001) in menopausal women. The highest proportion of combination was dyslipidemia with DM both in two groups, though it just missed the significance. Next was dyslipidemia with HTN and HDL+HTN+DM, they were significantly higher (<0.001) in menopausal women. The highest combination was dyslipidemia +HTN +DM, where 9.38% of menopausal women were suffering against 2.36% of premenopausal women (p=0.01).

Table 2: Components of MetS in pre and post menopausal women

Components (%)	Pre-M (%)	Post-M (%)	p
Waist	85.82±10.27	90.40±11.95	0.004
SBP	122.26±15.77	134.75±17.40	<0.001
DBP	75.09±11.71	81.38±11.79	<0.001
TG	153.87±92.07	175.88±94.47	0.07
HDL	34.70±6.43	35.95±6.31	0.12
FBS	105.55±52.22	126.78±66.16	<0.001
Obese	13 (6.13)	7 (10.94)	0.19
HTN	21 (9.91)	21 (32.81)	<0.001
DM	42 (19.81)	26 (40.63)	0.001
↑TG	83 (39.34)	33 (51.56)	0.08
↓HDL	204 (96.68)	62 (96.88)	0.94
MetS (ATP III)	42 (19.81)	32 (50.00)	<0.001
Dyslipidemia (↑TG+↓HDL)	76 (36.02)	29 (45.31)	0.17
TG + HDL + HTN	9 (4.25)	12 (18.75)	<0.001
TG + HDL + DM	33 (15.57)	16 (25.00)	0.08
HDL + HTN + DM	7 (3.30)	11 (17.19)	<0.001
TG+HDL+HTN+DM	5 (2.36)	6 (9.38)	0.01

Logistic regression was carried out with the significant components of MetS over menopause (Table 3). Crude odds ratio for HTN (OR=4.44) and high FBS (OR=2.77) was significantly higher in menopausal compared to premenopausal women. When adjusted, HTN came down near 3.80 and that of high FBS to 2.20, still remained significant. Obesity was not significant in either way. Finally, MetS was put as dependent and logistic regression was carried out with menopausal status, area of residence and education of respondents (Table 4) as these two variables were significant in univariate analysis. Only menopause became independently significant (OR=4.3) after adjusting for education and area of residence.

Table 3: Logistic regression of significant MetS components on menopausal status

Variables	Crude OR (95% CI)	Adjusted OR (95% CI)
HTN	4.44 (2.23-8.85)	3.79 (1.87-7.71)
Obesity	1.88 (0.72-4.93)	1.36 (0.48-3.88)
FBS	2.77 (1.52-5.06)	2.18 (1.14-4.17)

Table 4: Logistic regression of MetS with probable factors of association

Variables	Crude OR (95% CI)	Adjusted OR (95% CI)
Menopause	4.44 (2.23-8.85)	4.29 (2.32-7.96)
Some education	1.88 (0.72-4.93)	1.37 (0.64-2.91)
Good education	2.77 (1.52-5.06)	0.84 (0.33-2.16)
Rural	0.98 (0.53-1.82)	0.76 (0.39-1.48)

Discussion

MetS in menopause has clinical and public health implications[31] with a possibility of associating menopause and diabetes risk. It is also associated with HTN[32-34] which in turn has been identified as risk factors for cardiovascular disease (CVD). Though our study did not check any risk but it is found that the menopausal women are more prevalent with HTN and DM which proves the association hence the risk in menopausal life.

Obesity is a common feature in menopausal women[35-37] related with fracture, hormone level deficiency and even leading to Alzheimer's disease. Deibert et al[38]shows that a weight loss intervention program significantly reduces all the components score of MetS in both pre and post-menopausal women. HTN, DM and arthritis are among the common complains[39,40] found in the studies posing CVD risk too. Our study, though didn't check any CVD or Alzheimer's disease association, the higher prevalence of HTN, DM and obesity in menopausal women gives an external validity of the finding.

Our study found menopause to be independently associated with MetS irrespective of area and education of respondents. The prevalence of MetS in menopausal women was 50%, conforming to the study from Iran[41] showing 53.5% prevalence. Even their study has been similar to ours in the context of menopause being independent predictor of MetS in Iranian women. This study also gets support from Mesch et al[42] who concludes the frequency of MetS to increase in menopause starting from menopausal transition.

This study has some limitations. Information of food consumption was not detailed so it is not possible to say whether the obesity has a link with the food pattern or sedentary lifestyle or both. Because occupation was not associated with MetS it can be assumed that the obesity is more likely due to eating behavior rather than occupation. Nonetheless the study gives a community level finding to depict a baseline fact of MetS from which further hypothetical study can be carried out.

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