#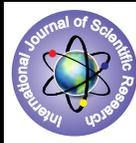 A Comparative Study on Metabolic Syndrome Using Different Criteria Among Rural Post-Menopausal Women in Singur, West Bengal, India

Soumi Srimani

PhD scholar, Department of Biochemistry & Nutrition, All India Institute of Hygiene & Public Health (Affiliated to The West Bengal University of Health Sciences), JC – 27 & 27B, Bidhan Nagar, Kolkata – 700106

Debnath Chaudhuri

Consultant, Department of Biochemistry & Nutrition, All India Institute of Hygiene & Public Health (Affiliated to The West Bengal University of Health Sciences), JC – 27 & 27B, Bidhan Nagar, Kolkata – 700106

ABSTRACT *Prevalence of Metabolic Syndrome (MS) among rural post-menopausal women using three different criteria was conducted among 116 post-menopausal women from five villages of Singur, West Bengal, India in order to assess their usability. Blood pressure; waist circumference; fasting blood glucose, serum triglycerides and serum HDL were measured. MS was defined using IDF, 2005 (for Asians); NCEP ATP III and the Consensus definition for Asian Indians (CDAI). Statistical analysis was performed using SPSS V:16. Prevalence of MS differed according to criteria used, being highest for the CDAI (40.52%). Prevalence of risk factors of MS among the women not having defined MS was high according to all criteria. Sensitivity, specificity, PPV, NPV and LR+ for CDAI against IDF were 100%, 87.18%, 79.17%, 100% and 7.8, respectively; whereas, for NCEP-ATP III these were 65.79%; 91.03%; 78.12%, 85.32% and 7.3, respectively.*

INTRODUCTION

Women with metabolic syndrome are especially at high risk for cardiovascular disease (CVD). Risk of metabolic syndrome increases with menopause and may partially explain the apparent acceleration in CVD after menopause (Carr, M.C., 2003). The transition from pre- to post menopause is associated with the emergence of many features of the metabolic syndrome, including 1) increased central (intra-abdominal) body fat; 2) a shift toward a more atherogenic lipid profile, with increased low density lipoprotein and triglycerides levels, reduced high density lipoprotein, and small, dense low density lipoprotein particles; and 3) increased glucose and insulin levels (Carr, M.C., 2003).

Clustering of cardiovascular risk within individuals has prompted several learned bodies to publish criteria to be considered as a diagnostic tool for the metabolic syndrome. The definitions with distinct differences which helps in the interpretation of metabolic syndrome are given by National Cholesterol Education Programme (NCEP) - Adult Treatment Panel III (ATPIII, 2001) & International Diabetes Federation (IDF, 2005) with ethnic specific cut-offs (IDF, 2006). Recently a Consensus statement has been issued for risk prediction among Asian Indians, 2009 (Misra, A. et al., 2009). Prevalence of MS varies with the diagnostic criteria used as there is a lack of diagnostic concordance between different definitions[5], resulting variation in the result.

OBJECTIVE

Present study was conducted to determine and compare the prevalence of MS among rural post-menopausal women using three different criteria in order to assess their applicability.

MATERIALS AND METHODS

This community based cross-sectional study was conducted in the field practice area of Rural Health Unit and Training Centre (RHU&TC) of All India Institute of Hygiene & Public Health (AIIH&PH) at Singur, West Bengal, India. After taking the informed written consent, 116 post-menopausal women, who experienced amenorrhoea for more than 12 months continuously, were selected randomly from 5 villages of RHU&TC, Singur. Women having pathological cause of amenorrhoea and surgery, history of thyroid problem, under hormonal replacement therapy, physically and mentally challenged condition and non-cooperative in nature were excluded from this study. Ethical Clearance Certificate was obtained from the Institutional Ethics Committee of the AIIH&PH. Systolic and Diastolic blood pressure, waist circumference; fasting plasma glucose, high density lipoprotein cholesterol and triglyceride were measured using standard protocols. IDF, 2005 (for Asian); NCEP – ATP III and Consensus Definition for Asian Indians (CDAI) criteria were used to define the prevalence and risk factors of metabolic syndrome.

RESULT

Fig.1: Distribution of Post-Menopausal Women according to One or More Risk Factors of Metabolic Syndrome as per three different criteria (N=116)

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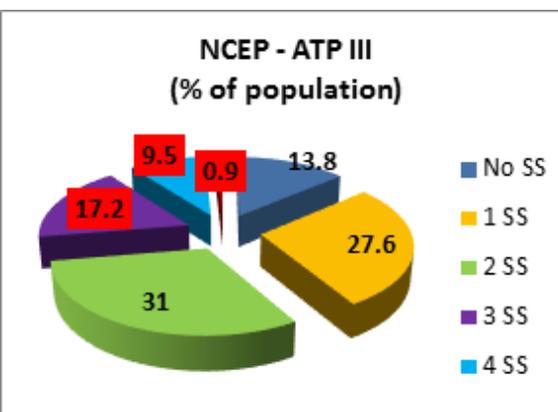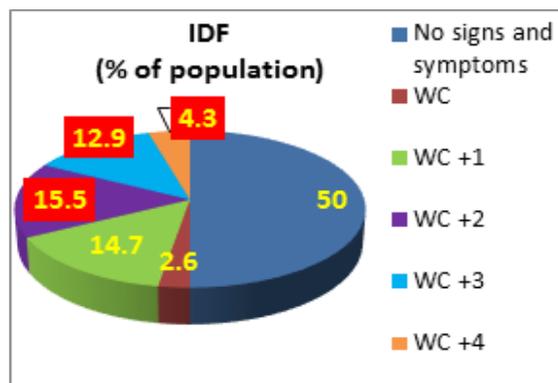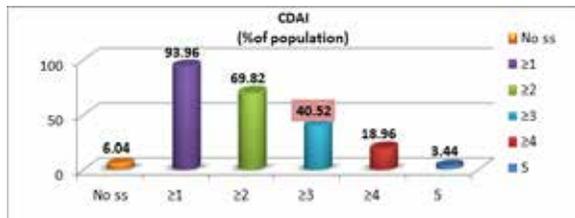
According to the IDF criterion, 50% post-menopausal women had no risk factors of Metabolic Syndrome. Only 2.6 % post-menopausal women had higher waist circumference (WC), in 14.66% subjects had 1 additional risk factor of Metabolic Syndrome with higher WC. 15.5%, 12.9%, 4.3% subjects had 2, 3 and 4 additional risk factors respectively with higher waist circumference and the prevalence of Metabolic Syndrome is **32.76%**. Similarly, **27.59%** and **40.52%** post-menopausal women were diagnosed as having MS according to the NCEP ATP – III and CDAI criteria respectively.

Table 1: Diagnosis of MS by Gold standard (IDF) and other criteria (NCEP ATP - III & CDAI) (n=116)

Diagnostic Criteria and agreement			IDF				IDF	
			MS				MS	
			Yes	No			Yes	No
Diagnostic Criteria	NCEP ATP - III	Yes	25	7	CDAI	Yes	38	10
		No	13	71		No	0	68
Agreement Statistics								
		NCEP ATP - III			CDAI			
Kappa		0.592			0.817			
Sensitivity		65.79 %			100.0 %			
Specificity		91.03 %			87.18 %			
Positive predictive value (PPV)		78.13%			79.17 %			
Negative predictive value (NPV)		85.32%			100.0 %			
Likelihood ratio of positive test (LR⁺)		7.33			7.8			
Likelihood ratio of negative test (LR⁻)		0.38			0.0			

NCEP ATP – III   **CDAI**
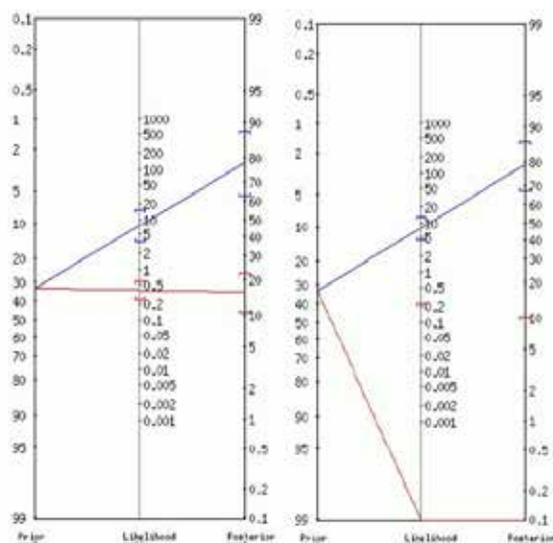
In this study, the IDF criterion is considered as the Gold Standard as waist circumference (WC), i.e., the presence of the central adiposity is an obligatory parameter for defining MS.

The sensitivity of CDAI criteria in detecting MS is 100% while that of NCEP ATP – III criteria is only 65.79%. Specificity of NCEP ATP - III was 91.03% while that of CDAI was 87.18%. All other indicators like PPV, NPV, LR+ and LR- are better for CDAI than NCEP ATP – III criteria. Kappa statistics also shows that the CDAI is better predictor of MS than NCEP ATP – III criteria as the agreement between CDAI & IDF criteria is 0.817 and that of between NCEP ATP – III & IDF criteria is 0.592.

DISCUSSION
Currently, in India, NCEP ATP-III, IDF and CDAI are more commonly used as the diagnostic criteria for MS. Those have been used in the study to determine the prevalence of MS and to compare between them for assessing their usability among rural post-menopausal women of Singur.

In a study entitled *"Metabolic Syndrome and Menopause: Cross-Sectional Study in Gynecological Clinic"* (Neto, J.A.F et al., 2010) the prevalence of MS was 44.4% and 61.5% according to the NCEP ATP – III and IDF criteria respectively. Whereas, as per the NCEP ATP – III criteria, 31% prevalence was reported among post-menopausal women of Gorgan[7]. Besides, in another study conducted by Das M. and Ghosh A., 48.2% MS prevalence was found among the Asian Indian women (Ghosh, A., 2008).

In a study among Chinese population, conducted by J. Sheng et. al, for screening of clustering of multiple risk factors of MS, IDF criteria was better than NCEP ATP – III and Chinese Diabetes Society (CDS) criterion (Jiang, S. et al., 2011). In another study by Fei YF et. al, the highest consistency (95.70%) occurred between the IDF (2005) and the ATP III (2005), with a kappa coefficient of 0.867 (P = 0.000), which led the conclusion that ATP III (2005) has stricter criteria for MS than the others (Fei, Y.F. et. al. 2012).

CONCLUSION
Almost one third of the study population was suffering from MS. Not less than 27.59% of the study population has been suffering from MS. Prevalence of MS differed according to criteria used, being highest for CDAI. Prevalence of risk factors of MS among the women not having defined MS was high according to all criteria. CDAI is a better predictor of MS than NCEP ATP – III among the study population. Screening and appropriate intervention needs to be initiated for early detection of MS and its risks among post-menopausal women.

CONFLICT OF INTEREST
None.

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