Metabolic syndrome among inmates of a 'home for aged' using IDF 2005 criteria

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ABSTRACT

To identify the metabolic syndrome (MetS) among inmates of a 'home for aged' using IDF 2005 criteria. 100 subjects from inmates of a 'home for aged' studied for the identification of metabolic syndrome using International Diabetes Federation (IDF) 2005 criteria. Presence of waist circumference (WC) (Men ≥ 90cm, Women ≥ 80 cm) plus any two of the following four factors; triglycerides (TG) >150mg/dl (1.7mmol/l),(II) HDL-Cholesterol (HDL-C) < 40 mg/dl(1.0mmol/l) for men, < 50 mg/dl(1.3mmol/l) for women, fasting plasma glucose (FPG) ≥ 100mg/dl (6.1mmol/l) and blood pressure (BP) ≥ 130/85mm of Hg. Indicated the MetS. MetS was present in 57.0%. WC was common component, TG was increased in 71.9%, low HDL-C present in 86.0%, raised FPG present in 66.7% and hypertension in 45.6%. MetS was more common in older women than in men (63.6% vs. 48.8%) and decreased HDL-C is core components of the MetS in this population. High calorie diet and sedentary life style may be contributing factors of MetS in this population. MetS is common in elderly subjects. It is age-related, and is more common in elderly women.

Keywords: Metabolic syndrome, IDF-2005, home for aged.

INTRODUCTION

In Asian Indians, an increasing pool of the Metabolic Syndrome (MetS) which is a concern, as much of it would converts to type 2 diabetes mellitus (T2DM) and cardiovascular disease (CVD) when effective interventions are not applied[1,2] thereby reversing the gains made through recent declining CVD mortality. MetS is not a new condition and was first described in the 1920s by Kylin, a Swedish physician, as the association of hypertension, hyperglycemia and gout.[3] In the 1940s, attention was drawn to upper body adiposity (android or male-type obesity) as the obesity phenotype commonly associated with T2DM and CVD.[4] In 1988, Gerald M Reaven presented Banting Lecture[5] and he described 'a cluster of risk factors for diabetes and cardiovascular disease' and named it 'Syndrome X'. His contribution was the introduction of the concept of insulin resistance. In 1989, Kaplan[6] renamed the syndrome 'The Deadly Quartet' and in 1992 this was renamed 'The Insulin Resistance Syndrome'.[7] It is now agreed that, the established term 'metabolic syndrome' remains the most common description of a cluster of metabolic abnormalities: abdominal obesity; dyslipidemia; hyperglycaemia; hypertension;[8,9] in particular intra-abdominal (visceral) fat accumulation is predictive of MetS.[10] The International Diabetes Federation (IDF) 2005 definition recognizes that visceral adiposity is common to each of the components of MetS. Hence now, an excessive waist circumference is a necessary requirement for the MetS.[11,12]

Based on existing estimates MetS affects nearly 1/4th of the population in developed countries[13] and the prevalence is increasing in developing countries, including India.[14]

The prevalence of the MetS has been in: Asian Indians 49.2% - 41.4% in males; 55.3% in females;[15] South Indian population - 16.1% without T2DM and 72.0% with T2DM;[16] Chennai general population 36.4% in men, 46.5% in women;[17] Jaipur population 22.9% in men and 39.1% in women.[18] To date no data is available on the prevalence of MetS in Karnataka. Hence, this cross sectional study was conducted with the objective of identifying the prevalence of MetS among inmates of 'home for aged and destitutes' in Mangalore, Karnataka using IDF 2005 criteria.[11]

MATERIALS AND METHODS

This was a prospective cross sectional study conducted in predominantly of elderly women of the Christian community inmates of home for aged and destitutes at Mangalore whose demographic and other baseline characteristics are described in Table-1. The Study was approved by Institutional Ethics Committee and written informed consent was obtained. Fasting venous sample was collected to determine: Fasting blood sugar (FBS); triglycerides (TG), low density lipoprotein-cholesterol (LDL-C); total cholesterol (TC); and high density lipoprotein-cholesterol (HDL-C) levels. Height in meters (m) and weight in kilograms (kg) were measured, and body mass index (BMI) was calculated as the weight in kilograms divided by the square of the height in meters. Obesity was defined as a BMI>=30kg/m^2. Waist circumference (WC) was measured on standing subjects with a soft tape midway between the lowest rib and the iliac crest. Hip circumference was measured over the

Table-1: Characteristics of the subjects

Characteristics	Women	Men
n (%)	55(55)	45(45)
Age (yrs)	61.7±14.8	63.2±6.9
Waist circumference(cm)	81.7±9.2	84.2±8.3
Waist to Hip Ratio(WHR)	0.84±1.2	0.86±0.1
Body Mass Index(kg/m2)	22.7±5.9	22.3±4.5
Systolic Blood Pressure(mm Hg)	149.0±25.4	147.6±30.6
Diastolic Blood Pressure(mm Hg)	82.1±12.0	80.0±14.8
Fasting Blood Glucose(mg/dl)	129.1±7.0	98.5±14.6
Total Cholesterol(mg/dl)	240.9±39.3	202.5±38.4
Triglycerides(mg/dl)	177.6±79.6	131.8±55.5
HDL-Cholesterol(mg/dl)	44.5±8.8	38.5±4.8
LDL-Cholesterol(mg/dl)	161.0±34.8	143.8±37.5

(Data are mean± SD, n=number of subjects)

widest part of the gluteal region (greater trochanters) and the waist to hip ratio (WHR) was calculated. Two blood pressure recordings were obtained from the left arm of patients in a sitting position after 10 min of rest at 5 min intervals, using standard mercury manometer and the mean value was calculated.

The study sample size was 100 (55 women and 45 men) who were invited for participation. This sample size was considered adequate for identification of MetS in home for aged and destitutes with a total population of 160. IDF-2005 guidelines for MetS were observed for diagnosis of MetS: Central Obesity with a WC of ≥ 90cm for men and ≥ 80 cm for women, and any two of the following four factors: 1. TG > 150mg/dl or specific treatment for this lipid abnormality; 2. HDL-C (Males < 40mg/dl and Females < 50mg/dl) or specific treatment for this lipid abnormality; 3. Hypertension ≥ 130/85 mmHg (systolic blood pressure SBP/diastolic blood pressure DBP) or treatment of previously diagnosed hypertension; 4. FBS ≥ 100mg/dl or previously diagnosed T2DM. Subjects; age less than 40 yrs, who were bedridden, or with acute illness, malignancy, acute tuberculosis and AIDS were excluded from the study.

Statistical analysis: The values are given as mean ±SD. The group frequencies were compared by Chi-square test and quantitative data were tested by student's t test (unpaired) and Mann Whitney 'U'test. The statistical analysis was performed with an SPSS programme for windows. P value <0.05 was considered statistically significant.

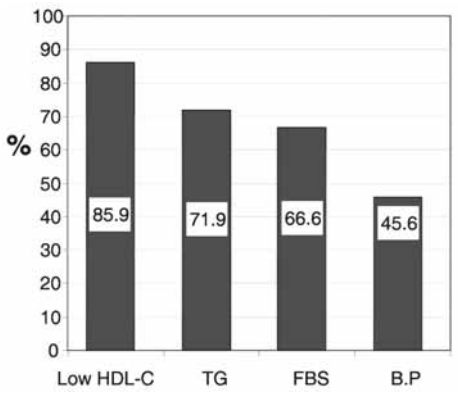

Fig.1. Risk factors of MetS

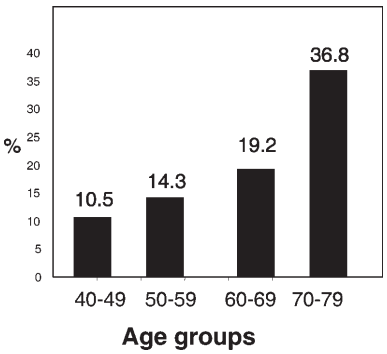

Fig. 2. MetS in various age groups

RESULTS

The baseline characteristics of subjects are given in Table-1. Using the proposed IDF.2005 criteria, MetS was present in 57.0% (63.6% in women and 48.8% in men) of the sample. WC was the common component, low HDL-C was present in 86.0%, TG was increased in 71.9%, and raised FBS was present in 66.7% and hypertension in 45.7% Fig. 1. There is an age related increase in the incidence of MetS, with largest incidence in the age group 70-79 years Fig .2. MetS was more common in older women than in men (63.6% vs. 48.8% P<0.01). Table-2 Shows the mean values of risk factors: in subjects with MetS and those without MetS; fasting blood sugar and triglycerides were significantly increased (P<0.001) in MetS patients compared to subjects without MetS.

DISCUSSION

This study shows a high prevalence of the metabolic syndrome 57.0% (63.6% in women and 48.8% in men). The contributing causes of MetS have been reported as obesity (especially truncal obesity), physical inactivity, cholesterol rising nutrients, aging and genetic factors.[19] The present study also shows that the prevalence of metabolic syndrome increased in an age related manner with a proportionately higher prevalence after the age of 40 years which coincides with the studies of Parale GP *et al*. and there was significant increase in TG and FBS (P< 0.001). Though the BMI is well within the

Table-2: Subjects with MetS and without MetS (normal subjects)

S.N.	Variables	With MetS (n=57)	Without MetS (n=43)	P value
1.	Gender ratio (Women/Men)	35 /22	20/23	NS
2.	Central obesity (waist circumference)	94.5/92.6	74.5/85.6	NS
3.	Age	61.7±14.8	63.2±6.9	NS
4.	SBP	156.3±25.8	140.3±24.6	NS
5.	DBP	85.3±11.9	77.8±12.7	NS
6.	FBS	138.7±78.1	102.4±30.7***	P<0.001
7.	TC	241.0±43.7	223.5±37.5	NS
8.	TG	190.3±77.8	134.7±61.1***	P<0.001
9.	HDL-C	42.3±8.0	45.1±8.8	NS
10.	LDL-C	159.3±36.3	154.6±35.1	NS

(All values are in mean± S.D. Subjects with MetS compared to those without MetS)

normal range still the component of increased central obesity is 87.0%. In those without metabolic syndrome Low HDL was altered frequently. In spite of normal BMI, prevalence of MetS is 57.0%; therefore genetic predisposition may have impact on this population. Higher prevalence of MetS in the older female subjects may be due to loss of estrogenic protective effect in the postmenopausal female.[20] The combination of traits in MetS may vary by race or ethnicity. The prevalence of metabolic syndrome in North Indian population; 31.0%,[18] in South Indian population 41.5%.[16] Parale GP *et al* determined prevalence of MetS in railway employees was 26.8% in males and 27.4% in females, MetS highly prevalent mainly in aged above 45 years or older.[21] Our study participants were from a single institute and do not represent the overall general population of Karnataka population. Studies are needed involving multigeographies and multiple institutes with larger sample size that will specifically enable to address the issues of contributory factors in multiracial and in groups of ethnic diversity.

Since, Reaven[5] first introduced a term for the Insulin resistance syndrome in 1988; most of the studies conducted to identify MetS are based on NCEP.ATP-III and WHO guidelines. Besides, there is a higher prevalence of MetS in women as compare to men in this study (63.6% in women and 48.8% in men) which coincides with the prevalence in Jaipur study (39.1% in women and 22.9% in men) and in the Chennai study. IDF definition may be the more appropriate for the identification of those with insulin resistance and increased risk of T2DM.[22]

In conclusion, the concept of MetS, especially the IDF-2005, may be helpful in the detection of MetS in Indian population where there is an alarming increase in the incidence of T2DM (According to the Diabetes Atlas 2006 published by the International Diabetes Federation, the number of people with diabetes in India currently around 40.9 million is expected to rise to 69.9 million by 2025).[23] Study subjects were largely leading sedentary lifestyle and high calorie diet may be contributing factors of this high prevalence. Now we initiated diet and life style modification in these subjects to reduce the risk factors of MetS and also we are doing genetic study to identify and impact of polymorphism in three candidate genes of MetS i.e. APOC3, FABP2 and PPAR-gamma 2. However; our sample size is small, voluntary selection bias were limitations of this study. A large sample size and longitudinal study design and comparison with other guidelines like ATP.III, WHO for the MetS are required for definitive evaluation.

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