Research Article

Attributes of metabolic syndrome in geriatric institutional residents in Secunderabad, India

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ABSTRACT

Background: Asians including Indians have a high prevalence of Metabolic Syndrome which carries a host of cardiovascular risk factors. Since a scarce information is available about the magnitude of Metabolic Syndrome amongst the geriatric population in India, present study was taken up to ascertain the prevalence of Metabolic Syndrome and its probable attributes among the geriatric population residing in old age homes in Secunderabad City (India).
Methods: All Geriatric individuals residing in two Old Age Homes in Secunderabad City were recruited and measurements were taken for their anthropometric parameters such as height, weight, waist circumference and hip circumference as well as blood pressure. Blood samples were collected from them after overnight fasting for biochemical assessment of fasting blood sugar level. The prevalence of Metabolic Syndrome was assessed by following the criteria adopted by in an Indian study. Data were analyzed by using SPSS 16 software package.
Results: Prevalence of Metabolic Syndrome was found 42.1% among the Geriatric affecting more females (62.3%) compared to males (p<0.05) and the condition was found significantly more (p<0.05) among overweight and obese Geriatric persons as compared to those had either normal BMI.
Conclusions: The magnitude of Metabolic Syndrome was high among the geriatric population under study causing a significant risk of undesirable cardiovascular events.

Keywords: Metabolic syndrome, Dyslipidemia, Type 2 diabetes mellitus, Body mass index (BMI), Impaired fasting glucose

INTRODUCTION

Metabolic Syndrome, a constellation of impaired glucose metabolism, dyslipidemia, hypertension, and central obesity, is not only associated with the subsequent risk of developing Type 2 diabetes mellitus and cardiovascular diseases (CVDs), such people being twice at risk to die from these morbid conditions, and three times as likely to have a heart attack or stroke compared to people without the syndrome.[1,2] Several studies have shown a high incidence of metabolic syndrome among Indians as compared to the Western population.[3,4] Studies have also demonstrated that the prevalence of metabolic syndrome increases with age and body mass index (BMI).[5,6]

The geriatric individuals (i.e. those more than 60 years of age) accounts for 7.4% of the total population in India and is projected to rise to 12.4% by the year 2026 which may pose mounting pressures on burden on health care facilities as well as health expenditures as this segment of population faces multiple and enormous medical and psychological problems.[7]

Surveys in large cities in different parts of India mainly concentrating on the urban adolescents and adults suggest that about one-third of these urbanites have metabolic syndrome.[8-10] It is also vitally important to understand the prevalence of Metabolic Syndrome in the Geriatric population in India since the country is undergoing demographic, social as well as disease transition.

Considering these facts the present study was planned with an objective to know the prevalence of Metabolic Syndrome and its probable socio-demographic, nutritional and behavioral correlates among the Geriatric population residing in old age homes in Secunderabad City of the state of Andhra Pradesh (now under Telengana).

METHODS

This study was cross-sectional in design and was conducted during the month of February and March 2013 among all the residents, aged 60 years or more, residing in two old age homes in Secunderabad City of India.

Considering the prevalence of Metabolic Syndrome of 49.2 % among urban adults as reported by Wasir et al,[11] an alpha error of 5% and an absolute allowable error of 10%, the desired sample size was calculated to be 96. The sample size was further inflated considering a probable 10% non-response rate. So, the final sample size was: n= 96 + 10% of 96 =106. All of the geriatric residents as per the age criteria (aged >60 years) living in these homes expressing willingness to participate voluntarily in our study was included. Those found seriously ill and or non-ambulatory during the data collection period and expressed unwillingness to participate were excluded from the study.

During the conduct of the study, pre-designed and pre-tested structured questionnaire, digital weighing scale (SECA), portable anthropometric rod (SECA), flexible fiber-glass measuring tape, mercury sphygmomanometer and commercially available kit for testing fasting blood sugar were used.

After obtaining permission from the management authorities of the two old age homes and informed written consent from the study participants, two trained interviewers interviewed the geriatric persons by using a pre-tested and pre-designed structured questionnaire. Blood pressure of each study participant was measured using mercury sphygmomanometers in sitting condition after 10 minutes of rest. The appearance of Korotkoff sound (Phase-1) and disappearance of Korotkoff sound (Phase V) were recorded as the measure of systolic and diastolic pressure respectively.

Anthropometric measurements like weight (to the nearest 0.1 kg), height and waist-circumference (to the nearest 0.1cm) were measured by following standard techniques.[12] BMI was calculated using standard formula. A venous blood sample after overnight fasting was taken from the each of the study participant for measurement of Fasting Plasma Glucose (FPG) level using 'Occuchek' strip. The cut-off value of Fasting Plasma Glucose ≥100 mg/dl was taken as hyperglycaemia among the non-diabetic persons assessment of the physical activity status was done by using ECOG scale[13] and also by recording information on total time spent for walking with or without regular exercise (minimum 30 minutes per day with minimum 5 days/week).

Though two most widely globally accepted criterion viz. "Modified National Cholesterol Education Programme's Adult Treatment Panel"[14] and "International Diabetes Federation"[15] were available, Metabolic Syndrome was identified in this study by following the criteria adopted by in an Indian study[11] due to some constraints. The defining criteria was : mandatory presence of central obesity (WC ≥90 cm in male and ≥ 80 cm in female or BMI >27.5 kg/m^2) along with presence of two other risk criteria as follows: (1) Blood pressure of ≥ 130/85 mm Hg or taking treatment for previously diagnosed hypertension; (2) History of taking specific treatment for lipid abnormalities; (3) Fasting Plasma Glucose ≥ 100 mg/dL or previously diagnosed Type 2 Diabetes Mellitus; (4) BMI greater than 27.5 kg/m² (as the Asian cut-off for marked obesity).[11]

The data were entered into Excel 2007 Microsoft Excel spreadsheet and analyzed by using SPSS 16 software package. The continuous variables were presented by mean ± SD and categorical variables were expressed in percentage. Prevalence of the Metabolic Syndrome was expressed in terms of proportion. The associations were assessed by the 'Chi-square' test. For all statistical tests, a p value <0.05 was considered as statistically significant.

RESULTS

Among the study participants, the majority (37.7%) belonged to the age group of 70-79 years while those representing 60-69 years and more than 80 years comprised 28.2% and 34.2% respectively. Males were slightly more (53.5%) than the females (46.3%). Nearly three fifth (57.9%) of the study subjects were either widow or widower and more than half of them were compelled to stay in the old age home owing to absence of children (10.5%), children not taking care of them (43%) or due other reasons (43%) (Table 1).

About two-thirds (65.8%) of the study participants were christians and rest one third (33.3%) were hindus. Nearly half (51.8%) of the study participants came from joint family.

Table 1: Individual characteristics of the study population.

Individual Characteristics		Number (n=114)	Percentages (%)
Age group (in years)	60-69	32	28.2
	70-79	43	37.7
	≥ 80	39	34.2
Sex	Male	61	53.5
	Female	53	46.5
Marital Status	Married		30.7
	Unmarried	11	9.6
	Divorced / Separated	02	1.8
	Widow/Widower	66	57.9
Reasons for staying in old age home	No Children	12	10.5
	Children not taking care	49	43.0
	Destitute	04	3.5
	Others	49	43.0
Religion	Hindu	38	33-3
	Christian	75	65.8
	Muslim/Others	01	0.88
Type of family	Joint	59	51.8
	Nuclear	14	12.3
	Extended Nuclear	10	8.8
	Others/No information	31	27.2

The prevalence of Metabolic Syndrome was found almost equal (around 40%) in the age group of 60-69 years as well as 70-79 years and slightly higher (46.2%) in the age group of ≥80 years. Also, metabolic syndrome was distributed almost equally (little more than 40%) among illiterates and those who had education between 1st and 10th standard as compared to among those who had education more than 10th standard (33.3%). Among different income strata, highest prevalence was among the middle income group (50.8%) followed by high (36.4%) and low (25.9%) income groups. The difference in the prevalence of Metabolic Syndrome among different age groups, different educational status and different income groups were not found to be statistically significant (p >0.05). However, the sex differential in prevalence of Metabolic Syndrome was statistically significant (p <0.05) as the condition was found almost twice more frequent among women than men (Women-41.5% and Men-21.3%). It was observed that the prevalence of Metabolic Syndrome increased proportionally with increasing BMI. While the prevalence of Metabolic Syndrome amongst overweight (BMI: 23-27.5 kg/m^2) and obese (BMI: ≥27.5 kg/m^2) individuals were 57.6% and 81.8% respectively, nearly one fourth (26.2%) of those having normal BMI (BMI: 18.5-23 kg/m^2) suffered from the same condition and not a single case was observed among the thin individuals (BMI: <23 kg/m^2). These differences in proportions of

Metabolic Syndrome among different BMI categories was statistically significant (p <0.05) (Table 2).

Table 2: Distribution of metabolic syndrome by individual characteristics.

Characteristics		Total population (N=114)		Met. syndrome (n=48)		p value
		N	%	n	%	
Age Group (In years)	60-69	32	28.1	13	40.6	0.816
	70-79	43	37.7	17	39.5	
	≥ 80	39	34.2	18	46.2	
Sex	Male	61	53.5	15	24.6	0.001
	Female	53	46.5	33	62.3	
Education	Illiterate	38	33.3	16	42.1	0.799
	1-10th	64	56.1	28	43.8	
	>10th	12	10.5	04	33.3	
Monthly income	Low	27	23.7	07	25.9	0.074
	Medium	65	57.0	33	50.8	
	High	22	19.3	08	36.4	
BMI (Kg/mt^2)	<18.5	17		0	0.0	0.000
	18.5-23	42		11	26.2	
	23-27.5	33		19	57.6	
	≥ 27.5	22		18	81.8	

Table 3: Distribution of metabolic syndrome by lifestyle and behavioral characteristics.

Characteristics		Total population (N=114)	Met. syndrome (n=48)		p value
			n	%	
Tobacco consumption (any form)	Present	45	13	28.9	0.032
	Absent	69	35	50.7	
Alcohol intake	Present	31	09	29.0	0.026
	Absent	83	39	47.0	
Diet	Veg.	18	09	50.0	0.324
	Non-Veg.	96	39	40.6	
Physical Activity (ECOG scale)	Gr I	29	16	55.2	0.184
	Gr II	37	14	37.8	
	Gr III	31	14	45.2	
	Gr IV	17	04	23.5	
Physical Exercise (per day)	≥30 min	30	14	46.7	0.784
	<30 min	49	19	38.8	
	Never		15	42.9	

Contrary to the common belief, Metabolic Syndrome was found significantly (p<0.05) more among non-smokers (50.7%) and those not consumed alcohol (47%) as compared to smokers (28.9%) and those consumed alcohol (29%). This condition was also more prevalent among vegetarians (50%) as compared to non-vegetarians (40.6%) though the difference was not significant (p>0.05). Again, metabolic syndrome was found slightly more (46.7%) among those used to perform regular (≥30min/day) physical activity as compared to those who either performed less (<30 min/day) exercise (38.8%) or never (42.9%). According to the current physical activity status as evaluated by ECOG scale, Metabolic Syndrome was found most prevalent amongst those individuals in Grade-I (55.2%) followed by Grade-III (45.2%), Grade-II (37.8%) and least in Grade-IV (23.5%) but these differences were not statistically significant (p>0.05) (Table 3).

DISCUSSION

The overall prevalence of Metabolic Syndrome was found to be 42.1% in this study with higher prevalence among women (62.3%) as compared to men (24.6%). A higher prevalence of Metabolic Syndrome was also reported among geriatric women as compared to men by Huang et al (21.5% among men & 36,7% among women) as well as Yao et al (30.2% among men & 48.2% among women).[16,17] Another study especially among geriatric population conducted by Lin WY et al in Taiwan in long term care facilities also reported an overall 27.1% prevalence of Metabolic Syndrome by IDF definition[13] with higher prevalence amongst women (Male: 11.4% and Female: 39.2%). Yet another study from USA by Ford et al[18] reported a 43.5% prevalence of Metabolic Syndrome by NCEP ATP III definition which was similar to our study findings. Wasir et al[11] reported 40.2% prevalence of Metabolic Syndrome among urban adults (≥18 years) from North India with higher prevalence among females (Male: 41.4% and Female: 55.3%) which was close to our study results. Some of the Indian studies[19-21] reported lesser prevalence of Metabolic Syndrome among adults (ranging from 24.9 to 31.4%) probably because of lower age group (<60 years) of the study subjects. In our study, higher prevalence of Metabolic Syndrome among women aged sixty or more was probably due to hormonal changes after menopause. One study also reported higher prevalence of Metabolic Syndrome among postmenopausal women.[22] Several studies have revealed that Metabolic Syndrome increase with age, more prevalent among smokers, those who consumed alcohol, partake junk food and do less physical activity[11,20,21,23-26] etc. However, in the present study, Metabolic Syndrome was not associated with age, type of diet, physical activities in a significant manner. Instead, opposite findings like increased prevalence of Metabolic Syndrome among non-smokers, those not consumed alcohol and those undertook more physical activities were found. The majority of the previously conducted

studies were conducted among adults but not amongst geriatric age group which probably lead to difference in the study findings. However, one study[13] revealed similar to our study results and the study was also carried out among geriatric people in long term care facility. The same workers also didn't find any association between Metabolic Syndrome and performance status like the current study. In the present study increased prevalence of Metabolic Syndrome was associated with increase in BMI status. Many studies also reported similar findings.[11,18-21,24,25,27,28]

Probably, this is the first study conducted in India which analyzed the prevalence of Metabolic Syndrome and its probable risk factors among the geriatric population residing in old age home. Since this study was conducted with a small sample size, the findings can't be generalized. Further cohort studies are necessary to ascertain the possible correlates of Metabolic Syndrome among Geriatric population.

Those found having either disease or modifiable risk factors for development of chronic life style disorders were referred to the nearest Government Hospital for further management.

CONCLUSIONS

Prevalence of Metabolic Syndrome was 42.1% among the Geriatric with significantly higher frequency (p <0.05) affecting more females (62.3%) as compared to males. The prevalence of Metabolic Syndrome was also significantly (p <0.05) associated with overweight and obese Geriatric individuals as compared to those who had normal BMI. Additional cohort studies are recommended to confirm or refute the findings of the present study.

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