

## A Spectrum of Metabolic Syndrome among Elderly Obese/ Overweight inpatients in a Rural Tertiary Care Hospital

Dr. R Lakshmi Visruja<sup>1</sup>, Dr. Sappa Naresh<sup>2\*</sup>, Dr. Y.J.V.Reddy<sup>3</sup>,  
Dr. Srinivasa Rao<sup>4</sup>, Dr. Nagaraj.N<sup>5</sup>

<sup>1</sup>(Assistant Professor, Department of General Medicine, PESIMSR/NTRUHS, Kuppam, India)

<sup>2</sup>(Postgraduate Resident, Department of General Medicine, PESIMSR/NTRUHS, Kuppam, India)

<sup>3,4,5</sup>(Professor, Department of General Medicine, PESIMSR/NTRUHS, Kuppam, India)

\*Corresponding Author: Dr. Sappa Naresh

### Abstract

**Background:** The metabolic syndrome (MetS), a cardiometabolic risk clustering is of public health significance. Diagnosing and managing the metabolic syndrome is beneficial for healthy ageing. There is little information in South India regarding MetS. The purpose of the study was to determine its prevalence in Overweight/ Obese elderly and its components.

**Methods:** Elderly obese/overweight patients aged more than 60 years admitted at our hospital were included. International Diabetes Federation (IDF) criteria was used to diagnose MetS. Relevant data was collected and analysed.

**Results:** Elderly obese/ overweight, 100 inpatients were included in the study. The prevalence of MetS in our study was 92%. Females (56%) were higher than males (44%). Hypertension was found to be significantly associated with MetS. Patients with Impaired fasting blood glucose and Diabetic patients on treatment were 92.6%. Serum cholesterol was high (>240mg/dl) in 7% of subjects. If Low density lipoprotein (LDL) above 100mg/dl cut off is taken as abnormal it showed increase levels in 78% of the patients. Mean lipid profile values suggested significant dyslipidemia.

**Conclusion:** Ageing increases the prevalence of MetS. Dyslipidemia was found to be very significant. A high prevalence in this rural population of Southern India calls for a comprehensive non communicable disease prevention and control programme.

**Key words-** Metabolic syndrome, IDF, Elderly, Obesity/Overweight

Date of Submission: 05-02-2018

Date of acceptance: 23-02-2018

### I. Introduction

In the last few decades, there is an increase in life expectancy and also age associated/related diseases. Metabolic syndrome contributes to high morbidity and mortality in this elderly population group which is a cluster of cardiovascular and metabolic risk factors<sup>1</sup>.

Metabolic syndrome (MetS) is characterised by abdominal obesity, atherogenic dyslipidemia, insulin resistance and hypertension<sup>2</sup>. The main underlying pathology is insulin resistance which increases with age<sup>3</sup>, contributing to a higher risk of developing cardiometabolic disorders<sup>4</sup>. Abdominal obesity, raised triglycerides, low HDL, elevated blood pressure and impaired fasting glucose or diabetes mellitus are the five variables in the criteria for Metabolic syndrome<sup>3</sup>.

The prevalence of MetS in general population is 17 to 25%<sup>5,6</sup> and in Diabetes mellitus it ranges from 59% to 61%<sup>5,6,7</sup>. In the elderly, the studies have shown varied prevalence rates<sup>8,9,10</sup>.

Identification and treatment of Metabolic syndrome helps to reduce morbidity and disability in the elderly. There are limited studies regarding its prevalence in elderly worldwide and especially in India. The present study was conducted to determine the prevalence of the components of the Metabolic syndrome in a rural setting. This study was undertaken in our centre which provides health care to Andhra Pradesh, Tamil Nadu and Karnataka population.

### II. Materials and Methods

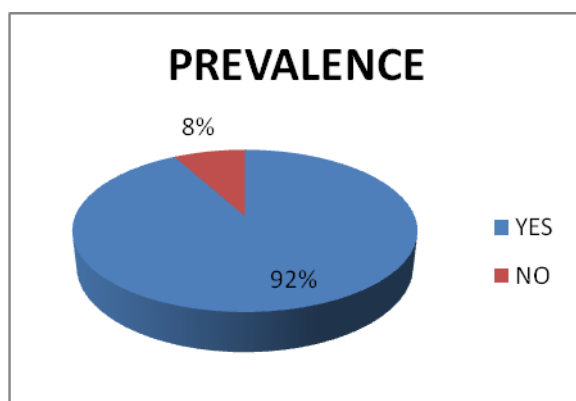
Elderly patients aged more than 60 years (as defined by United Nations) admitted at PESIMSR hospital in medical wards with various ailments over a study period of 1 year were included if found to have Obesity/ Overweight. This study is a descriptive single centre cross sectional study conducted at PESIMSR (Peoples education society institute of Medical Sciences and Research), Kuppam, South India. Ethical approval was obtained from Ethical committee and informed consent obtained from subjects.

Data was collected as per predesigned proforma. A detailed clinical examination and estimation of biochemical parameters were done. All serum and plasma samples were taken in fasting state. International Diabetes Federation (IDF) criteria was used for definition of Metabolic syndrome<sup>11</sup>. Overweight was defined as Body Mass Index (BMI)  $\geq 23$  kg/m<sup>2</sup>, Obesity was defined if BMI  $\geq 25$  kg/m<sup>2</sup> according to Asia Pacific guidelines (World Health Organisation- West Pacific Regional Office). Impaired fasting plasma glucose was defined as  $\geq 100$ mg/dl. Hypertension was defined as  $>130/85$ mmHg or patients on treatment for the same. Dyslipidemia was defined as serum cholesterol more than 240mg/dl as high, LDL more than 190mg/dl as very high and  $>100$ mg/dl as above optimal, serum HDL less than 40mg/dl for both men and women was considered as low and triglycerides more than 150mg/dl was taken to be high in our study. Insulin estimation could not be done because of lack of facility.

Patients already on oral hypolipidemic drugs and alcoholics were excluded from the study. The data was entered into MS Excel 2007 version and analysed using SPSS software. A probability value of  $< 0.05$  was considered statistically significant.

### III. Results

A total of 100 patients aged above 60 years with overweight/Obesity were included in the study. The prevalence of Metabolic syndrome in was 92% as shown in Fig1.



**Figure 1** Prevalence of Metabolic syndrome in elderly obese/ overweight patients

The mean age of the study subjects was 63.9yrs (3.84) with 86% of subjects in the age group of 60-69years. The prevalence was similar between age groups 60- 69 and  $>70$  years (91.9 vs 92%). Females (56%) were higher than males (44%) in this study.

#### 3.1 Clinical characteristics

**Table1** Clinical characteristics of study subjects

GROUP STATISTICS	Mean	Std. Deviation
AGE in years	63.946	3.8470
DURATION OF Diabetes Mellitus(DM) in years	12.076	5.4172
DURATION OF Hypertension in years	9.663	4.8341
Waist :Hip Ratio	1.08	0.24
Waist circumference in centimetres	87.8	8.4
HBA1C%	8.850	2.0630

#### 3.2 Clustering of components- metabolic syndrome

The distribution of components is shown in table 2

**Table2** Frequency of occurrence of components of Metabolic Syndrome

Parameters	Frequency (%)
Abnormal Waist to hip ratio	76
Hypertension	55
Elevated Triglycerides	96.2
Decreased HDL	35.8
Impaired Fasting blood sugar/ Diabetes Mellitus	92.6

Hypertension was found in 55% of the subjects and its association with Metabolic syndrome was found significant .Diabetes mellitus was pre existing in 58.6% of study patients. In the current study, 92.6% of patients had impaired fasting blood glucose or were already diabetic patients on treatment. Elevated HbA1c ( $\geq 7\%$ ) was found in 68% of subjects.

Abnormal waist to hip ratio was seen in 76% of the subjects, out of whom 94.7% of patients had Metabolic syndrome.

### 3.3 Pattern of Dyslipidemia

Total serum cholesterol was high in 7% of subjects with LDL being very high in 4% but if LDL above 100mg/dl is taken as abnormal( above optimal) it showed increase in 78% of the patients.

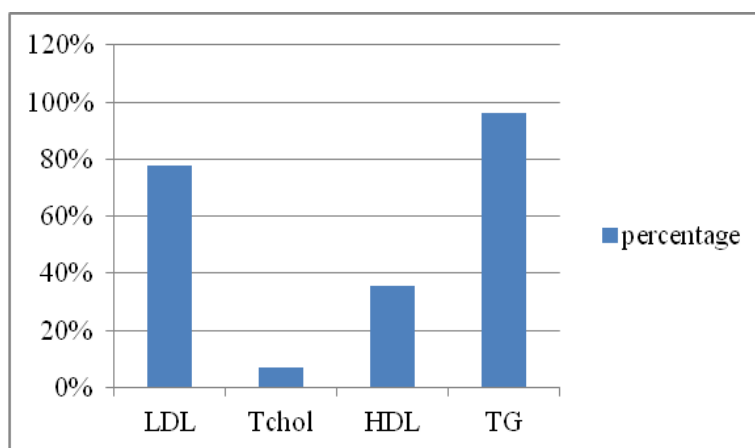
**Table3** Lipid profile pattern

LIPID PROFILE	MetS	Mean	Std. Deviation	P Value
Total Cholesterol	YES	174.228	50.7088	P=0.062
	No	154.125	23.5702	
High Density Lipoprotein	YES	40.457	15.1007	P=0.022*
	No	46.750	5.5227	
Low Density Lipoprotein	YES	93.511	38.7957	P=0.036*
	No	76.125	17.8681	
Triglycerides	YES	192.022	86.0788	P=0.032*
	No	138.000	56.0535	

\*= statistically significant

High density lipoprotein (HDL)<40 mg/dl was seen in 35.8% of patients. High TGs were found in metabolic syndrome group(96.2% vs 3.8%).

Mean lipid profile values suggested significant dyslipidemia of HDL, LDL and Triglycerides. Females were found to have higher levels than men. The frequency of dyslipidemia is as shown in Fig 2.



**Figure 2** Frequency of lipid abnormalities

### IV. Discussion

Obesity, sedentary lifestyle, ageing, diabetes mellitus, coronary heart diseases are risk factors for Metabolic syndrome. The prevalence rate is found to be higher in elderly<sup>12</sup>. In the present study, we included overweight/obese elderly inpatients and found the prevalence to be very high (92%). In a study by Athyros et al, in Greece, the prevalence was 69% among elderly using IDF criteria<sup>9</sup>. A study of elderly in China showed higher prevalence in women than men (54.1% vs 34.8%) using IDF criteria<sup>10</sup>. A study in Urban eastern India showed a prevalence of 65.6% among 60-69 years age group<sup>8</sup>. Using different defining criteria for metabolic syndrome and different inclusion criteria give variations in the prevalence.

There is varied occurrence of Metabolic syndrome components, with increasing prevalence of higher waist circumference, showing 88% in women and 74% in men aged between 60 and 69 years<sup>13</sup>. In our study, higher prevalence of waist to hip ratio in 76% of subjects was seen. Hypertension found in 55% of subjects is lower compared to a study by Prasad et al which showed hypertension in 69.3% of subjects<sup>8</sup>. Impaired fasting glucose was seen in a high percentage of study subjects. Laaksonen et al described increased risk for Diabetes with metabolic syndrome<sup>14</sup>.

In the present study, HbA1c was high in 92% of the diabetic subjects and most of them were non compliant with medication and lifestyle changes advised.

Serum total cholesterol was elevated in 7% of subjects but elevated LDL > 100mg/dl was found in 78%. LDL although not a component of Metabolic syndrome is one of the frequently documented abnormalities. Its occurrence showed higher magnitude of risk of coronary artery disease<sup>15</sup>. Low HDL is very common among Asian Indians<sup>16,17</sup>. We found 35.8% of subjects having low HDL. Triglycerides were abnormal in 96.2% of subjects with a mean of 174mg/dl in males and 198mg/dl in females which is significant. In a study by Alexander et al, mean Triglycerides was 162.6mg/dl meeting National Cholesterol Education Program (NCEP) criteria<sup>18</sup>. In a study by Rigo et al, high TGs were present in 34% of men and 38% of women<sup>19</sup>. This can be due to different study population genetics and /different lifestyle. All the varying results show that there is a higher need for regional studies and to strongly consider ethnic aspects and regional habits of the population.

## V. Conclusion

The prevalence of metabolic syndrome was high in the elderly using IDF criteria. Ageing which causes metabolic abnormalities, increases the prevalence of Metabolic syndrome. Dyslipidemia was found to be very significant in the present study. A high prevalence in this rural population of Southern India calls for a comprehensive non communicable disease prevention and control programme. Increasing awareness of cluster of risk factors and how to prevent them should be emphasised in population wide prevention strategies.

## Acknowledgements

Dr. Karthik. A, Dr. Venkatesh Potru

## References

- [1]. K. Denys, M. Cankurtaran, W. Janssens, M. Petrovic. Metabolic syndrome in the elderly: An overview of the evidence. *Acta Clinica Belgica*, 2009;64-1
- [2]. Deedwania PC, Gupta R. Management issues in the metabolic syndrome.
- [3]. *J Assoc Physicians India* 2006, 54:797-810.
- [4]. Alberti KG, Eckel RH, Grundy SM, Zimmet PZ, Cleeman JI, Donato KA, et al. Harmonizing the metabolic syndrome: a joint interim statement of the International Diabetes Federation Task Force on Epidemiology and Prevention; National Heart, Lung, and Blood Institute; American Heart Association; World Heart Federation; International Atherosclerosis Society; and International Association for the Study of Obesity. *Circulation* 2009;120:1640-45.
- [5]. Facchini FS, Hua N, Abbasi F, Reaven GM. Insulin resistance as a predictor of age-related diseases. *J Clin Endocrinol Metab* 2001;86:3574-8
- [6]. AlSaraj F, McDermott JH, Cawood T, McAteer S, Ali M, Tormey W, Cockburn BN, et al. Prevalence of the metabolic syndrome in patients diabetes mellitus. *Ir J Med Sc* 2009, 178(3):309-313.
- [7]. Wahab KW, Sani M, Gbadamosi M, Yandutse M. Frequency and determinants of the metabolic syndrome in apparently healthy adult Nigerians. *Trop Doct* 2008, 38:224-226.
- [8]. Isezuo SA, Ezunu E. Demographic and clinical correlates of metabolic syndrome in Native African type 2 diabetic patients. *J Natl Med Assoc* 2005, 97(4):557-563.
- [9]. Prasad DS, Kabir Z, Dash AK, Das BC. Prevalence and risk factors for metabolic syndrome in Asian Indians: A community study from urban Eastern India. *Journal of cardiovascular disease research*. 2012 Jul 1;3(3):204-11.
- [10]. Athyros VG, Ganotakis ES, Elisaf M, Mikhailidis DP. The prevalence of the metabolic syndrome using the National Cholesterol Educational Program and International Diabetes Federation definitions. *Curr Med Res Opin*. 2005; 21 (8): 1157-9.
- [11]. He Y, Jiang B, Wang J, Feng K, Chang Q, Fan L, et al. Prevalence of the metabolic syndrome and its relation to cardiovascular disease in an elderly Chinese population. *J Am Coll Cardiol*. 2006; 47 (8): 1588-94.
- [12]. Zimmet P, Magliano D, Matsuzawa Y, Alberti G, Shaw J. The metabolic syndrome: a global public health problem and a new definition. *J Atheroscler Thromb* 2005;12:295-300.
- [13]. Ford ES, Giles WH, Dietz WH. Prevalence of the metabolic syndrome among US adults: findings from the third National Health and Nutrition Examination Survey. *JAMA* 2002;287:356-9.
- [14]. Alkerwi A, Donneau A, Sauvageot N, Lair ML, Scheen A, Albert A, et al. Prevalence of the metabolic syndrome in Luxembourg according to the Joint Interim Statement definition estimated from the ORISCAV-LUX study. *BMC Public Health*. 2011;11(1):4.
- [15]. Laaksonen DE, Lakka HM, Niskanen LK, Kaplan GA, Salonen JT, Lakka TA: Metabolic syndrome and development of diabetes mellitus: application and validation of recently suggested definitions of the metabolic syndrome in a prospective cohort study. *Am J Epidemiol* 156: 1070-1077, 2002
- [16]. Campbell C, Nasir K, Sarwar A, Meneghelo R, Carvalho J, Blumenthal R, Santos R. Combined Effect of High Low-Density Lipoprotein Cholesterol and Metabolic Syndrome on Subclinical Coronary Atherosclerosis in White Men Without Clinical Evidence of Myocardial Ischemia. *The American Journal of Cardiology* 2009, 100(5):840-843.
- [17]. Misra A, Khurana L. The metabolic syndrome in South Asians: Epidemiology, clinical correlates and possible solutions. *International Diabetes Monitor*. 2009;21:92-101.
- [18]. Khanam MA, Qiu C, Lindeboom W, Streatfield PK, Kabir ZN, Wahlin A. The Metabolic Syndrome: Prevalence, Associated Factors, and Impact on Survival among Older Persons in Rural Bangladesh. *PLoS ONE*. 2011;6(6):e20259
- [19]. Alexander CM, Landsman PB, Teutsch SM, Haffner SM. NCEP-defined metabolic syndrome, diabetes, and prevalence of coronary heart disease among NHANES III participants age 50 years and older. *Diabetes*. 2003 May 1;52(5):1210-4.
- [20]. Rigo JC, Vieira JL, Dalacorte RR, Reichert CL. Prevalence of metabolic syndrome in an elderly community: comparison between three diagnostic methods. *Arquivos brasileiros de cardiologia*. 2009 Aug;93(2):85-91

Dr. R Lakshmi Visruja "A Spectrum of Metabolic Syndrome among Elderly Obese/ Overweight inpatients in a Rural Tertiary Care Hospital. "IOSR Journal of Dental and Medical Sciences (IOSR-JDMS), Volume 17, Issue 2 (2018), PP 40-43.