

A Study of Prevalence of Metabolic Syndrome in Apparently Normal Population in Rural Maharashtra

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Abstract

With the receding threats of communicable diseases, and looming over threats of Coronary Artery Disease, Hypertension and Diabetes Mellitus, the research in the later has been focused on detection of their preclinical stages. The co-occurrence of metabolic risk factors for both Type 2 Diabetes and CVD suggested the existence of a "metabolic syndrome". From a clinical perspective, the importance of the metabolic syndromes is attributable to two factors: 1) it is extremely common, and 2) it is a target for the prevention of and therapy for the multiple disorders with which it is associated. In India, age-standardized prevalence rates of metabolic syndrome are 33.5%. Sedentary lifestyle, older age, female gender, obesity, inadequate fruit intake, hypercholesterolemia, and middle-to-high socioeconomic status significantly contribute to increased risk of metabolic syndrome. This study was conducted to assess the prevalence of metabolic syndrome in apparently normal population attending Medicine Outpatient Department of a tertiary care hospital and to analyse the risk factor profile of the individuals with Metabolic Syndrome.

In our study 39 out of 150 subjects (26%) were found to have metabolic syndrome using ATP III Revised Criteria. The prevalence increased as the age advanced (51% in 40-59-year age group and there

was female preponderance (37 vs 19%). High blood pressure, Body mass index, Waist circumference, Hypertriglyceridemia, high fasting blood sugar level, Low HDL cholesterol in blood, Aging & High LDL cholesterol in blood were the risk factors associated with high prevalence of Metabolic syndrome.

Keywords: Metabolic Syndrome; ATP III Criteria, Risk Factors.

Introduction

With the receding threats of communicable diseases, and looming over threats of Coronary Artery Disease, Hypertension and Diabetes Mellitus, the research in the later has been focused on detection of their preclinical stages i.e. detection of genetic, cellular, metabolic and biochemical mechanisms and processes so as to arrive at the ability to forestall their progression to clinical illnesses. The co-occurrence of metabolic risk factors for both Type 2 Diabetes and CVD (abdominal obesity, hyperglycaemia, dyslipidaemia, and hypertension) suggested the existence of a "metabolic syndrome" [1-4].

From a clinical perspective, the importance of the metabolic syndromes is attributable to two factors: 1) it is extremely common, and 2) it is a target for the prevention of and therapy for the multiple disorders with which it is associated. Based on recent Adult Treatment Panel (ATP III) diagnostic guidelines, overall prevalence of the metabolic syndrome in the United States was 33% (95% CI, 32.5%-33.5%), with significantly higher prevalence in women compared with men (35.6% vs 30.3%, respectively, $P < .001$) in adults older than 20 [5]. In India also, prevalence rates of metabolic syndrome were 33.5% - 41%. Older age, female gender, general obesity, inadequate fruit intake, hypercholesterolemia, and middle-to-high

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socioeconomic status significantly contributed to increased risk of metabolic syndrome [6,7]. In addition, the metabolic syndrome is becoming increasingly prevalent in adolescents and children in parallel with the increase in obesity in this population.

This study makes an effort for detection of metabolic syndrome and its risk factors in Non - Diabetic population using various simple clinical methods and laboratory investigations, attending medical OPD. It is aimed at giving insight into the extent of Metabolic Syndrome in general population.

Aims and Objectives

1. To study the prevalence of metabolic syndrome in apparently normal population attending Medicine Outpatient Department of a tertiary care hospital.
2. To analyze risk factors profile of the patients with Metabolic Syndrome.

Material and Methods

Study Design

- The present study was carried out at Department of Medicine, DVVPF's Medical college during March 2016 to August 2016. The total number of patients studied was 150.

Inclusion Criteria

Age > 18 years and all of them were not previously known to have diabetes or hypertension or any significant disease or disorder.

Exclusion Criteria

All patients, those who were found to have hypertension, diabetes, valvular heart disease, cardiomyopathies with pathological q - waves on ECG, Ischemic Heart disease, Renal disease, Liver disease, and pregnant women or women on contraceptives.

Methodology

A detailed medical history of the patients including symptomatology, details of past illnesses, occupation, illnesses in the family and other co-morbid illnesses

were obtained.

- A complete physical and cardiovascular examination was performed. Blood pressure was measured with a mercury sphygmomanometer in a standardized fashion.
- Each patient's anthropometrical measurements were obtained. Height was recorded to the nearest cm. without foot wear; weight was obtained on a regular weight scale and recorded to the nearest five hundred grams with the lightest of clothing. BMI was calculated in each of them.
- Fundoscopic examination was performed.

Biochemical Investigations

Each patient underwent laboratory investigations of Urine examination, fasting blood sugar estimation, blood urea, serum creatinine levels and a fasting lipid profile.

Measuring prevalence of metabolic syndrome - by help of ATP III Revised Criteria 2005 (Table 1).

Statistical Analysis

Statistical analysis of the observations was done with a view to provide a logical support to the results and arriving at a better understanding of the study and its outcome.

Analysis

General Profile

Table 2 shows general demographic distribution of patients taken for the study. Maximum patients are in 20-39 years of age, while less number of patients are there from both extremes of age. Male patients were 63% and female were 37%.

Prevalence of Metabolic Syndrome

39 out of 150 (26%) study subjects were found to have metabolic syndrome. This prevalence is somewhat lower than seen in other Indian and USA studies, probably because the bulk of the study group in this study was rural. Study done at Chennai by Ramachandran A et al in 2003 found 41% of patients with metabolic syndrome in urban Asian Indian adults [7]. Here prevalence is more as patients were categorized as having metabolic syndrome by ATP III criteria with waist circumference modified to ≥ 90 cm for Indian male and ≥ 85 cm for Indian female [8,9]. R. Gupta and Prakash Deedwania, Jaipur, with

their study held in 2004, found 31.6% of subjects having metabolic syndrome [10].

Age Distribution and Prevalence of Metabolic Syndrome

Bar Diagrams 1 & 2 shows age and gender wise distribution of metabolic syndrome. It is evident from the bar diagrams that metabolic syndrome is more prevalent in older age group. Metabolic syndrome was not found in subjects below 20-year age group and only 12% in 20-39-year age group, while it was detected in 51% and 43% of the subjects in 40-59 years and ≥ 60 years age group respectively. NHANES III study in US population also shows increase prevalence of metabolic syndrome with increase in age [5]. Bar diagram 2 shows high prevalence of metabolic syndrome in female population (37%) than in male population (19%). Study done by Ramachandran et al 2003 and Rastogi P. and R. Gupta 2007 also suggested that metabolic syndrome is more prevalent among Indian women [7,10].

Obesity and Prevalence of Metabolic Syndrome

Bar diagram 3 reveals very high prevalence of metabolic syndrome in obese patients. It suggests obesity is an important and integral part of metabolic syndrome. Our finding is in accordance with that of P. Rastogi and R. Gupta. Obesity can also be defined

by high waist circumference and it is a better tool to measure central obesity. According to V. Mohan and M. Deepa, Madras diabetic research centre in 2007 for Indian population cut off value is > 87 cm for man and > 82 cm woman [10]. Obese group, derived by high waist circumference, showed 50% prevalence of metabolic syndrome. Study done by P. Rastogi and R. Gupta, June 2007 suggest similar steep rise in the presence of metabolic syndrome in patient with high waist circumference group [12].

Blood Pressure and Prevalence of Metabolic Syndrome

The study subjects were divided into hypertensives and Non hypertensives according to the JNC VIII [9] guidelines. Respectively (Bar Diagram 5). The bar diagram clearly shows prevalence of metabolic syndrome high (73.33%) in hypertensive group.

Biochemical Risk Factors and Metabolic Syndrome

In our study, subjects with metabolic syndrome had higher mean fasting blood sugar (130 mg/dl vs 85 mg/dl in those without metabolic syndrome), higher mean serum triglycerides (174 mg/dl vs 124 mg/dl), higher mean serum LDL cholesterol (161 mg/dl vs 131 mg/dl) and lower mean HDL cholesterol (34 mg/dl vs 57 mg/dl).

Table 1: ATP III revised criteria 2005

ATP III Diagnostic criteria for the Metabolic Syndrome	
Risk Factor	Defining Level
Abdominal obesity (waist circumference)	
Men	>102 cm
Women	>88 cm
Triglycerides	>150mg/dL
HDL cholesterol	
Men	<40 mg/dL
Women	<50 mg/dL
Blood pressure	>130/80 mmHg
Fasting glucose	>100 mg/dL

Age distribution and prevalence of metabolic syndrome

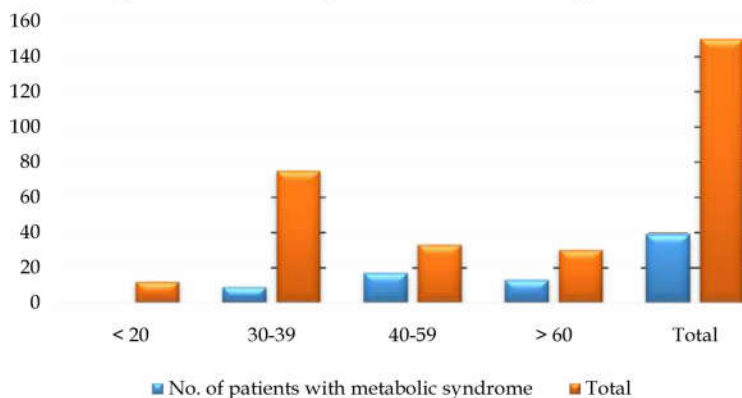


Fig. 1: Age-wise Prevalence of Metabolic Syndrome

Table 2: Age & sex distribution

Age group (in yrs)	No. of patient
< 20	12
20-39	75
40-59	33
≥ 60	30
Male	95
Female	55
Total	150

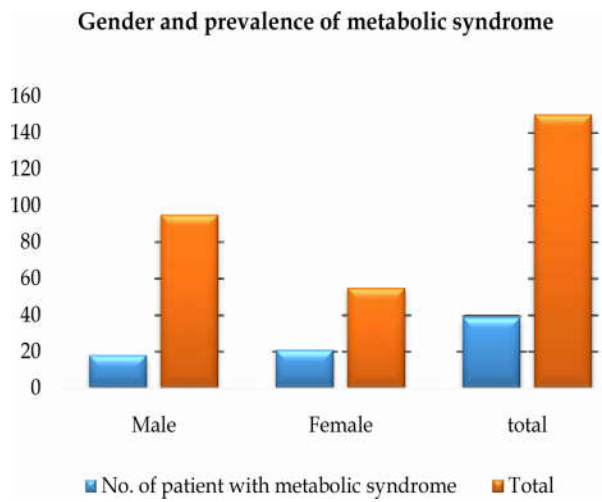


Fig. 2: Gender-wise distribution of metabolic syndrome

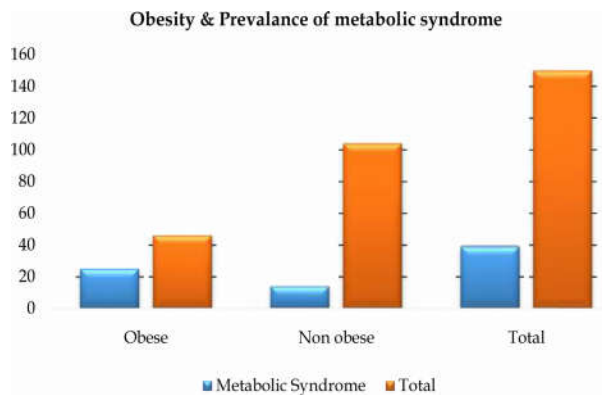


Fig. 3: Prevalence of metabolic syndrome as per BMI

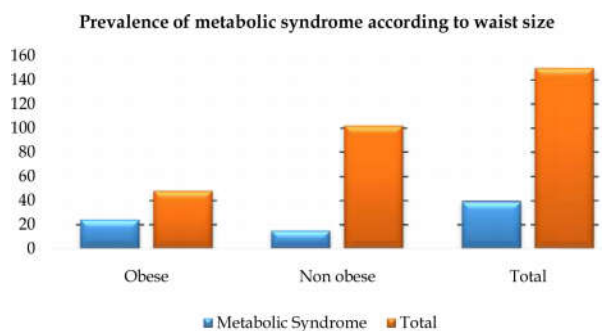


Fig. 4: Prevalence of metabolic syndrome according to waist size

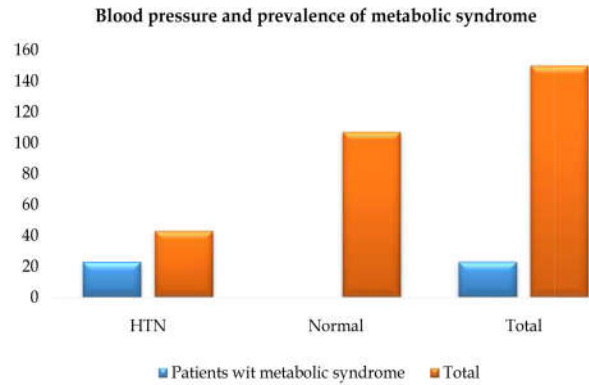


Fig. 5: Prevalence of Metabolic Syndrome as per Blood Pressure

Conclusion

- This study revealed significantly high prevalence of metabolic syndrome in apparently normal individuals. Presence of metabolic syndrome found in 26% according to ATP III revised criteria.
- The presence of metabolic syndrome found higher in the hypertensive group as compare to pre- hypertensive and non- hypertensive group.
- Metabolic syndrome is highly prevalent among obese group people, especially in those with central obesity. Waist circumference is a very important risk factor for metabolic syndrome.
- The statistical analysis of the study results revealed contributing factors for the development of metabolic syndrome are High blood pressure, Body mass index, Waist circumference, High S. Triglyceride level, High fasting blood sugar level, Low HDL cholesterol in blood, Aging & High LDL cholesterol in blood.
- The method used for defining metabolic syndrome and scoring system used are based on clinical criteria, so can be useful for screening of general population as they do not require any costs or higher investigation.

They can be easily incorporated in the health check-up schemes in hospitals for healthy individuals. Investigations and anthropometric measurements required for these methods are simple and can be done anywhere.

These individuals with objective documentation of presence of metabolic syndrome in them will further motivate than to institute lifestyle modification measures, aimed at prevention of diabetes and atherosclerosis.

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