

## Original Research Article

# A study on prevalence of metabolic syndrome in general population in Western Uttar Pradesh, India

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### ABSTRACT

**Background:** A global transition in the disease pattern has been observed, where the relative impact of infectious disease is decreasing while chronic disease like cardiovascular disease and diabetes are increasingly dominating the disease pattern. Metabolic syndrome (MetS) is a complex web of metabolic factors that are associated with a 2-fold increased risk of CVD and 5-fold risk of diabetes.

**Methods:** A total of 350 patients were included and a cross sectional study was conducted to identify metabolic syndrome prevalence and to evaluate risk factor for development of metabolic syndrome.

**Results:** 48% of participants were male and 52% were female our results showed a BMI of  $22.11 \pm 3.57$  in male and  $22.16 \pm 2.82$  in females. The overall prevalence of overweight was 31%. This study also showed significantly higher rate of metabolic syndrome in older age group i.e. 9.38% in age group of 30-39 years and 26.98% in 60-70 age group. Proportionally more subjects with MetS (74%) have sedentary life style as compared to those without MetS (54%).

**Conclusions:** The prevalence of Metabolic syndrome varies among ethnic groups. Indians are at high risk for ASCVD and their predisposition. The high prevalence of overweight and obesity was one of the major driving force in the development of MetS.

**Keywords:** Atherosclerotic cardiovascular disease, BMI, Cholesterol, MetS

### INTRODUCTION

Non-communicable diseases which include diabetes, cardiovascular diseases, cancer, chronic respiratory diseases, hypertension, obesity and mental illness have emerged as global pandemics in recent year with disproportionately higher rates in developing countries and India is no exception.<sup>1</sup> The metabolic syndrome consists of a constellation of metabolic abnormalities that confer increased risk of cardiovascular diseases and diabetes.<sup>2</sup> The major features of metabolic syndrome include central obesity, hypertriglyceridemia, low HDL cholesterol, hyperglycemia and hypertension.<sup>3</sup> Obesity and physical inactivity are the main driving force behind this syndrome.<sup>4</sup> MetS often associated with other medical condition notably fatty liver, cholesterol gallstones,

obstructive sleep apnea, gout, depression, musculoskeletal disease, polycystic ovarian syndrome.<sup>5</sup> The mechanism of MetS is resistance to insulin stimulated glucose uptake seems to modify biochemical responses in a way that predisposes to metabolic risk factor. A central role has been attributed to pro inflammatory cytokines, tumor necrosis factor and IL-6 supported by the fact that both are produced in substantial amounts by human adipose tissue. C-reactive protein levels have also been found to correlate with BMI and some features of the MetS.

Epidemiologic studies conducted by Ramchandran A et al in Indian population centers have estimated a prevalence of metabolic syndrome to encompass approximately one third of individuals residing in large

cities.<sup>6</sup> Kanjilal et al have shown in their study that Asian Indian have a high predisposition to MetS and coronary artery disease.<sup>7</sup> MetS prevalence has been estimated using various criteria like Adult treatment panel III (ATP III) and World Health Organization (WHO) criteria and modified definitions which included lowered cut offs for waist Circumference (WC $\geq$ 90cm for men and  $\geq$ 80cm for woman), body Mass index (BMI $\geq$ 23mg/m<sup>2</sup>) and impaired fasting glucose level ( $\geq$ 110mg/dl).

**METHODS**

It is a cross sectional study conducted over one and half years of time period at Santosh Medical College and Hospital, Ghaziabad, Uttar Pradesh, India. 350 cases of general population aged between 30 to 70 years were included.

**Inclusion criteria**

- Age more than 30 and less than 70.
- Fasting plasma glucose  $\geq$ 100 mg/dL.
- Blood pressure >130/85 mm of Hg
- Triglycerides  $\geq$ 150 mg/dL
- HDL- Men: <40mg/dL, Woman: <50mg/dL
- Obesity- men: waist circumference  $\geq$ 90cm, woman: waist circumference  $\geq$ 80cm

**Exclusion criteria**

- Coronary artery disease
- Diabetes Mellitus
- Critically ill patient
- History of angioplasty
- Age <30 or >70 years.

Persons enrolled in the study were evaluated for various cardiovascular risk factors like smoking, hypertension, glucose intolerance, fasting lipid profile including total CL, HDLCL, LDL CL and TG, obesity (by BMI) and central obesity (waist circumference), family history of DM, HTN and CAD, socio- economics status and ECG. We followed NCEPATP III guidelines with a modification to the obesity criteria that is more applicable to the Asian Indian population and look for difference between the various components.

**Statistical analysis**

Significant difference in proportions of potential lifestyle factors by MetS were estimated using Pearson’s chi-square. Univariate logistic regression was performed using SAS software (9.1.2), NC, Carry, United State to predict potential significant prediction of MetS.

**RESULTS**

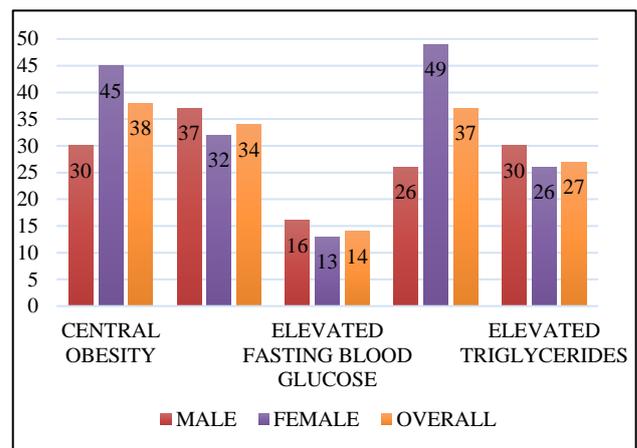
48% of participants were male and 52% were female our results showed a BMI of 22.11 $\pm$ 3.57 in male and

22.16 $\pm$ 2.82 in females. The overall prevalence of overweight was 31%. NCEP ATP III guidelines were applied for diagnosing metabolism syndrome prevalence was significantly higher among females with 20.33% (n=37) then in males 12.5% (n=21). This study also showed significantly higher rate of metabolic syndrome in older age group i.e. 9.38% in age group of 30-39 years, 26.98% in 60-70 age group. Proportionally more subjects with MetS (74%) have sedentary life style as compared to those without MetS (54%).

**Table 1: Prevalence of clustering of metabolic syndrome components (N=350).**

Components	
Nil	21 (6%)
One	210 (60%)
Two	61 (17.43%)
Metabolic syndrome (As per modified NCEP ATP III guidelines with 3 or more than 3 criteria)	58 (16.57%)

All the individual components of MetS increased significantly with age. Overall in our study low HDL (38%) was the commonest abnormality observed and elevated blood sugar (14.6%) was least common.



**Figure 1: Prevalence of individual component of metabolic syndrome.**

**DISCUSSION**

Asian Indians are a high risk population with respect to diabetes and CVD, and the numbers are consistently on the rise.<sup>8</sup> The prevalence of MetS is increasing exponentially in India, both in the urban and rural areas. A prevalence study of urban community in Northern India reported a prevalence of 22.37% for metabolic syndrome on the contrary of lower prevalence of 19.52% was reported in an urban population in western India.<sup>9,10</sup> In present study the prevalence is still lower which is 16.57%. The lower prevalence of MetS in present study might be due to low age group range included (30 to 70 years) which is low comparable to other studies. The

novel aspects of this study is that along with prevalence of individual component of MetS all the risk factors of development of ASCVD were systematically assessed.

The limitations of present study are that it is an observation study and therefore no causal inferences can be made. Longitudinal follow up studies are important to identify unknown and known risk factor on the causal pathway of cardio metabolic risk in ethnically diverse population for comprehensive control and prevention of CAD and diabetes mellitus among wider Asian Indian community.

## CONCLUSION

Prevalence of MetS varies among ethnic groups Indians are at high risk for ASCVD and their predisposition. The prevalence of MetS in present study was greater for females and males. This reveals the increasing prevalence of MetS with age. The high prevalence of overweight and obesity was one of the major driving forces in the development of MetS. Therefore, early identification of the metabolic abnormalities and appropriate intervention may be of primary importance in population.

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