



## Prevalence of Metabolic Syndrome in Type 2 Diabetes Mellitus Patients in Tertiary care Hospital of Rohelkhand of U.P (Bareilly)

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### ABSTRACT

*The present study was carried out to find out the prevalence of metabolic syndrome (MetS) in tertiary care hospital of Rohelkhand of U.P.*

**Material and Methods:** *A total of 200 type 2 diabetes patients (85 men and 115 women) presenting to department of medicine were selected for the study. Anthropometric (waist circumference), clinical (blood pressure) and biochemical (serum triglycerides, HDL, fasting and post-prandial blood glucose) data were recorded. Patients receiving treatment for hypertension or dyslipidemia were also included in the study and these were considered in the diagnosis of MetS even if the parameters were normal. The National Cholesterol Education Program Adult Treatment Panel III guidelines were used to diagnose MetS. The chi-square test was used to determine statistical significance, which was taken as a p value <0.05.*

**Results:** *The prevalence of MetS among urban Indian diabetic patients was 73.5% and was significantly higher in women (61.2%) as compared to men (38.8%). The most prevalent risk factors for MetS were hypertension, followed by hypertriglyceridemia, in men, and low HDL, followed by high waist circumference, in women.*

**Conclusions:** *MetS is highly prevalent in the diabetic population. More females than males had the MetS. Uncontrolled diabetes and abdominal obesity were prevalent. It should be identified by regular screening in individuals from the general population to avert or delay the progression to type 2 diabetes in order to reduce diabetes-related morbidity and mortality.*

**Keywords:** *Metabolic syndrome; Type 2 diabetes mellitus*

### INTRODUCTION

The hyperglycemic condition in diabetics makes them prone to developing some complications, which contribute to the morbidity and mortality, and the prevalence of this disease continues to rise.<sup>1,2</sup> Currently, there is heightened interest in a cluster of some risk factors called metabolic

syndrome (MetS) that predicts cardiovascular disease and type 2 diabetes mellitus<sup>3</sup>. Metabolic syndrome (MetS) is a group of anthropological and biochemical abnormalities that confers a greater risk factor for type 2 diabetes mellitus (T2DM) and cardiovascular disease (CVD). It is also called as Syndrome X, dysmetabolic

syndrome, insulin resistance syndrome,<sup>4,5</sup>. It comprises the following major characteristics: Hypertriglyceridemia, low levels of high-density lipoprotein-cholesterol (HDL-C), central obesity (abdominal) obesity, hypertension and concomitant insulin resistance/glucose intolerance (hyperinsulinemia).<sup>6</sup> The MetS is known to be caused by insulin resistance or insulin resistance-linked obesity, a condition whereby the body's cells are incapable of taking up glucose from the blood. Insulin resistance-linked obesity is caused by poor dieting and lack of regular exercise. Other genetic or lifestyle risk factors/predictor variables equally lead to the metabolic MetS. They are increasing age (greater than 40 years), smoking of cigarette, alcohol intake, overweight, sedentary life-style and family history of type 2 diabetes.<sup>7</sup> It is associated with a three to five fold increased risk for the development of type 2 diabetes mellitus<sup>8</sup> which has now reached high proportions in many countries.<sup>9</sup> The worldwide prevalence of MetS is between 7.9% and 43% in males and 7% and 56% in females.<sup>10</sup> Though a limited amount of data exists on the prevalence of metabolic syndrome in India. present study was performed to determine the prevalence of metabolic syndrome in tertiary care hospital bareilly region.

## MATERIAL AND METHODS

Type-2 diabetic patient were selected from the department of medicine SRMS IMS bareilly . The period of study was between JAN 2013 to DEC 2013. The cross-sectional study included 85 males and 115 females, with a mean age of  $50.21 \pm 1.46$  years and  $50.45 \pm 1.02$  years, respectively. Information about participants' age, sex, monthly income, life style, family history of diabetes, and prior diseases/disorders history were recorded. Patients previously diagnosed with and taking medications for hypertension, diabetes or dyslipidemia were also included in the study. Excluded from the study were type 1 diabetics and pregnant women. Selected anthropometrical parameters such as height, weight, and waist

circumferences were measured with the participant being barefooted and dressed lightly. The abdominal (waist) circumference was measured at the end of expiration, by wrapping a tape at the level of the umbilicus. Body mass index (BMI) was calculated as  $\text{kg/m}^2$ . Blood pressure (BP) was measured with a special precaution to reduce the variation of BP value with resting values; individuals were requested to take 20 minutes rest prior to measuring the BP with a standard mercury sphygmomanometer instrument.. The lipid profile was measured by different diagnostic centers as selected by the patients. According to the NCEP ATP III criteria,<sup>11</sup> the diagnosis of metabolic syndrome was made when three or more of the following was present: waist circumference  $>102$  cm in men and  $>88$  cm in women, fasting glucose  $110$  mg/dl ( $6.1$  mmol/l), systolic blood pressure  $>130$  mmHg or diastolic blood pressure  $>85$  mmHg, fasting triglycerides  $>150$  mg/dl ( $1.7$  mmol/l), and HDL cholesterol  $<40$  mg/dl ( $1.0$  mmol/l) in men and  $<50$  mg/dl ( $1.3$  mmol/l) in women. The chi-square test were used to determine statistical significance, which was taken as a p value  $<0.05$ .

## RESULTS

The study population comprised of 200 type-2 diabetic patients, out of which 85 (42.5 %) male and 115 (57.5 %) female. The overall mean age of the population was  $50.21 \pm 0.85$  yrs, where as male and female were  $52.56 \pm 1.46$  and  $50.45 \pm 1.02$  yrs respectively. Using the ATP III guidelines, metabolic syndrome was found in 147 patients (73.5%), of which 57 (38.8%) were men and 90 (61.2%) were women. The prevalence of metabolic syndrome in the female was about 1.58 times higher compared to male. Clinical, demographic and laboratory data of all patients are presented in Table 1

**Table-1** : Clinical, demographic and laboratory data of all diabetics.

PARAMETER	MALE (n = 85)	FEMALE (n = 115)	TOTAL
AGE	52.56 ± 1.46	50.45 ± 1.02	50.21 ± 0.85
YRS OF DIABETES	8.82 ± 7.0	8.97 ± 7.54	89.01 ± 6.54
SYSTOLIC B.P	134 ± 2.10	136.60 ± 1.74	134.20 ± 1.90
DIASTOLIC B.P	76.02 ± 2.10	79.68 ± 1.02	76.10 ± 1.0
BMI	24.0 ± 0.60	28.01 ± 0.7	26.40 ± 40
SERUM TG	182.32 ± 100.0	179.7 ± 102.2	184.21 ± 1.3.70
SERUM HDL	40.02 ± 10.05	46.4 ± 10.98	41.64 ± 10.90
WAIST CIRCUMFRANCE	96.70 ± 10.07	94.89 ± 10.0	98.7 ± 10.45
FBS	178.20 ± 56.0	187.09 ± 50.09	158.20 ± 50.01
PPBS	250.07 ± 90.02	286.08 ± 97.09	230.09 ± 90.06

For the overall population, low HDL was the commonest component (27.2%) of the MetS, followed by high waist circumference, or central obesity. In females, lowered HDL was the most common component (20.40%), followed by high waist circumference (17.0%). In males, hypertension was the most common component (10.20%), followed by hypertriglyceridemia (8.16%). Central obesity and low HDL were the only components that showed statistically significant difference between males and females.

**Table 2** : Prevalence of individual components of metabolic syndrome.

PARAMETER	MALE	FEMALE
High WC	10	25
Elevated FBS	10	15
Elevated TG	12	10
Lower HDL	10	30
Elevated blood pressure	15	10
TOTAL	57 (38.8%)	90 (61.2%)

Considering the 147 diabetic patients also diagnosed with metabolic syndrome, it was found that 23 (15.6%) were positive for all five risk factors, 54 (36.7%) had four risk factors, and 70 (47.6%) had three risk factors.

**Table-3:** Proportion of positive criteria in patient with metabolic syndrome.

CRITERIA	NO. OF METABOLIC SYNDROME	%
3	70	47.6
4	54	36.7
5	23	15.6

## DISCUSSION

Metabolic syndrome has been on the rise, contributing to the increasing prevalence of non communicable disorders such as cardiovascular diseases and type 2 diabetes mellitus. A major finding of this study was a high prevalence of metabolic syndrome among individuals with type 2 diabetes. The NCEP/ATP III criteria was chosen to assess MetS prevalence because the indicators used are easily and readily measurable. The prevalence of metabolic syndrome was higher 73.5 in our study, similarly Imam et al.<sup>12</sup> reported a prevalence of 79.7% from Pakistan, Bruno et al.<sup>13</sup> reported a prevalence of 75.6% from the USA and Foucan et al.<sup>14</sup> reported a 77% prevalence of metabolic syndrome in diabetic Indian immigrants in the USA. Females showed higher prevalence of MetS (61.2%) as they had more of the risk factors contributing to MetS, compared to males (38.8%), which was consistent with a previous study by Felix-Val *et al.*<sup>15</sup> and Ford *et al.*<sup>16</sup>. female were 1.58 times more likely to have metabolic

syndrome than man. the reason may be due to a relatively sedentary life style of women and due to genetic factor.

Our study also demonstrated a higher prevalence of metabolic syndrome among women as compared to men. Women also had a higher prevalence of low HDL and central obesity. This could partially be attributed to the lower cut-off for waist circumference and higher cut-off for HDL in women as compared to men. Therefore, probably more women were classified as having central obesity or low HDL. In adults who have type 2 diabetes, the presence of metabolic syndrome is associated with a fivefold increase in CV risk independent of age, sex, smoking status, and glycated hemoglobin (HbA1c).<sup>17</sup>

### CONCLUSION

In conclusion, our data demonstrates that metabolic syndrome is extremely common among diabetic patients, making it a risk factor for the development of diabetes and its complication. Therefore, it is imperative that aggressive therapy be aimed at controlling dysglycemia, dyslipidemia and hypertension.

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