# PREVALENCE OF METABOLIC SYNDROME IN AN URBAN NORTH INDIAN DIABETIC POPULATION

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## ABSTRACT

To find out the prevalence of metabolic syndrome among a north Indian diabetic population.it is a cross-sectional study of the data of 300 subjects, obtained from two diabetic clinics of Delhi. Demographic characteristics, anthropometric findings and biochemical parameters were extracted. The new International Diabetes Federation definition was used to define the subjects with metabolic syndrome.the proportion of diabetic subjects having co-morbidities like obesity, dyslipidemia and hypertension was very high – 88.3%, 57.7% and 75% respectively. However, according to the new IDF definition the proportion of subjects having MetS was low (19.3%).Diabetic patients have other co-morbidities that add to their cardio vascular risk and so; stringent actions must be taken to correct these anomalies.

**Key words:**Metabolic syndrome, Dyslipidemia, Hypertension

**No: of Tables: 1** **No: of Figures:1** **No: of References: 38**

## INTRODUCTION

Diabetes is a big public health problem that is affecting both developed and developing economies with a prevalence of 387 million (8.3%) worldwide, which is predicted to be 592 million by 2035.[1] India has the highest number of diabetics in the world (62 million) and it is predicted that by 2030 the disease might afflict as high as 79.4 million individuals.[2]In 2015, there were over 1 million deaths in India that were attributed to diabetes.[3] These deaths are mainly through the increased risk of cardio-vascular disease (CVD), which is responsible for up to 80 per cent of them.[4]Often the individuals with diabetes have other metabolic abnormalities – the clustering of which contributes to the overall morbidity and mortality profile.[4]The World Health Organization predicted a 50% increase in deaths from diabetes over next 10 years, and diabetes is projected to be the 7th leading cause of death by 2030.[5]This clustering of specific metabolic abnormalities is called the metabolic syndrome (MetS).

It has been estimated that around 20-25 per cent of the world's adult population is suffering from the MetS[6]and they are two times as likely to die from and three times as likely to have a stroke or heart attack compared with people without the MetS.[4]The prevalence in general urban Indian population is 31.6%.[6]

Each component of MetS poses certain amount of risk, however when more than one component is present simultaneously, the risk is multiplied.[4,7,8]The cardiovascular complications of diabetes account for much of the social and financial burden of the disease, and are also leading cause of amputations, kidney failure and blindness.[4]One component of MetS is dyslipidemia. Atherogenic dyslipidemia denotes a combination of elevated triglycerides and small-dense LDL particles, and low levels of HDL cholesterol and is closely implicated in the pathogenesis of coronary heart disease (CHD).[9]Second component is central obesity. Central obesity can be defined as an abnormal fat distribution, which is characterized by a high waist-to-hip circumference ratio or high truncal subcutaneous fat. It is an important component as this factor appears to predispose an individual to developing insulin resistance and dyslipidemia.[9-11]Obesity increase the risk of long-term vascular complications of type 2 diabetes mellitus (T2DM), including stroke, chronic kidney disease, heart disease, peripheral vascular disease, and death.[12-18]Similarly, co-existence of hypertension and diabetes leads to increased micro-vascular and macro-vascular complications like coronary artery disease, cardiovascular disease, peripheral vascular disease, stroke, nephropathy, retinopathy and neuropathy.[19,20-25]Hypertension can contribute to as much as 75 % of all diabetes mellitus related complications, including nephropathy and end stage renal disease.[19]

Though few studies on MetS are available, prevalence of the same in diabetic population of this part of the country is lacking.[26,27] The prevalence predicts the number of people with increased cardio-vascular and other risks

and will help in reducing the burden of co-morbidities by timely intervention and prevention. The present study was conducted to determine the prevalence of MetS amongst diabetics attending two clinics in Delhi.

## Materials & methods

### Study participants:

It is a cross sectional study involving the data obtained from 300 patients with diabetes attending 2 diabetes clinics in Delhi between June-Dec 2015.

### Data collection:

A brief medical history was obtained having information like age, sex, duration of diabetes, family history, physical activity, diet and any other chronic disease. Blood pressure (BP) was measured using a standard electronic BP monitor in sitting position. Hypertension was confirmed by taking 2 readings 15 minutes apart. Height was measured to the nearest millimeter with a wall-mounted Harpenden stadiometer and weight was measured with electronic scales to the nearest 0.1 kg.[28] Body mass index (BMI) was calculated in kg/m$^2$. The abdominal/waist circumference was measured by wrapping aninelastic tapeat the end of expiration, at the level of the umbilicus.[26]

### Blood sample collection:

Blood sample was collected the next day after 8 hours of fasting and tested for fasting glucose, triglycerides, HDL-C and low-density lipo-protein cholesterol (LDL-C). Post-prandial blood glucose sample was also collected after 2 hours of breakfast.

### Operational definitions:

This study follows the new International Diabetes Federation (IDF) definition to define the cases of metabolic syndrome. The criterion states that anyone having central obesity along with any of the 2 of the 4 criteria has MetS.[4]

The 4 critera are –

- Raised triglycerides (≥ 150 mg/dL/ 1.7 mmol/L or specific treatment for this lipid abnormality),
- Reduced High Density Lipoprotein cholesterol (< 40 mg/dL/ 1.03 mmol/L in males, < 50 mg/dL/ 1.29 mmol/L in females or specific treatment for this lipid abnormality),
- Raised blood pressure (systolic BP ≥ 130 or diastolic BP ≥ 85 mm Hg or treatment of previously diagnosed hypertension)
- Raised fasting plasma glucose (≥ 100 mg/dL/ 5.6 mmol/L, or previously diagnosed type 2 diabetes).

### Statistical analysis:

Clinical and bio-chemical characteristics are expressed as mean and standard deviation. Continuous variables were compared using Student's t-test, and categorical variables were compared using the $\chi 2$ test. For statistical analyses, SPSS version 18 (SPSS Inc., Chicago, IL, USA) was used and a p value of less than 0.05 was considered significant.All statistical tests were 2-tailed.

**Ethical considerations:** Since the study involved the use of data that has already been collected, a waiver was obtained from the institutional ethics review board of the organization (Lifespan Diabetes and Metabolic chain of clinics). The data was kept under lock and only the investigator who was responsible for data

collection was allowed access to the same. Confidentiality was maintained so that no personal details of the patients are ever revealed.

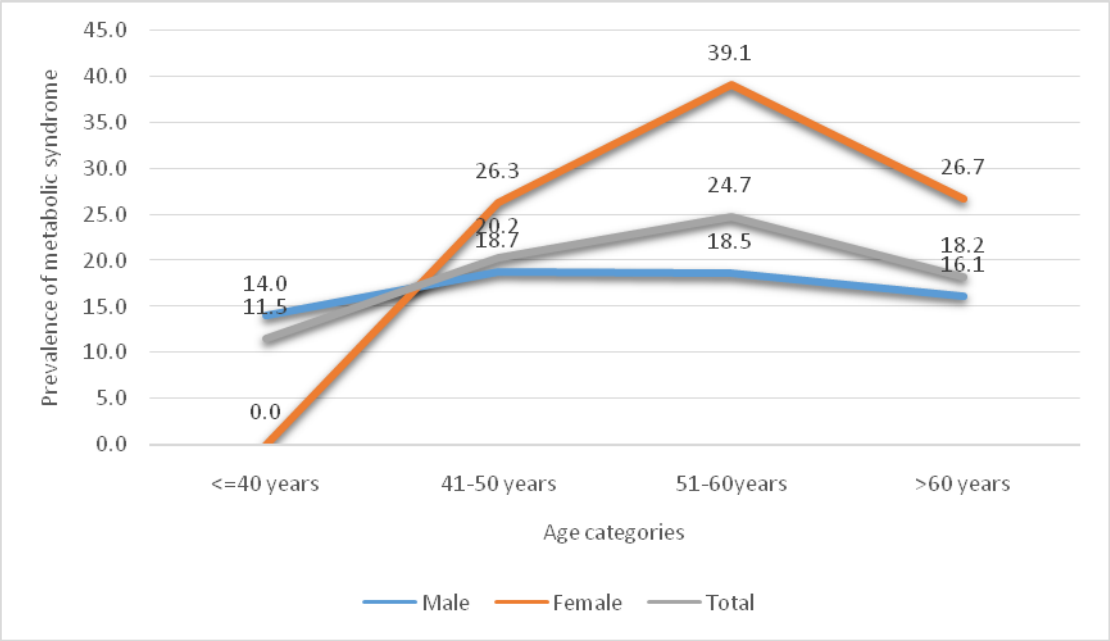
**Results**:

The characteristics of the study population (n=300) have been depicted in Table no. 1. The mean age of the

**Table no. 1: Characteristics Of The Study Population (N=300)**

| Characteristics | N (%) |
|---|---|
| **Age** | |
| <=40 years | 52 (17.3) |
| 41-50 years | 94 (31.3) |
| 51-60years | 77 (25.7) |
| >60 years | 77 (25.7) |
| **Gender** | |
| Male | 234 (78) |
| Female | 66 (22) |
| **BMI categories** | |
| Underweight | 5 (1.7) |
| Normal | 30 (10) |
| Overweight | 36 (12) |
| Obese | 146 (48.7) |
| Morbid obesity | 83 (27.7) |
| **Hypertension** | |
| No | 75 (25) |
| Yes | 225 (75) |
| **Dyslipidaemia** | |
| No | 127 (42.3) |
| Yes | 173 (57.7) |
| **Other co-morbidities** | |
| Yes | 107 (35.7) |
| No | 193 (64.3) |
| **Oral hypoglycaemic agents intake** | |
| No | 12 (4) |
| Yes | 288 (96) |
| **Insulin** | |
| No | 242 (80.7) |
| Yes | 58 (19.3) |

**Figure 1 : Prevalence of Metabolic Syndrome Among Different Age Groups**




subjects is 51.84 +/- 11.52 years. The mean age of onset of diabetes is 44.25 +/- 10.24 years. The number of subjects having dyslipidemia and hypertension was 173 (57.7%) and 225 (75%) respectively. The number of subjects having central obesity according to the proxy parameter - Body Mass Index (BMI>30)[4] is 59 (19.7%). However, according to the BMI, only 10% (n=30) of the subjects were having normal weight. The number of subjects who were overweight, obese and morbidly obese were 36, 146 and 83 (12%, 48.7% and 27.7%) respectively. The remaining 5 (1.7%) were underweight.

Of the 300 subjects, 58 were found to have metabolic syndrome. Hence the prevalence is 19.3% [95% CI: 15.3%-24.2%]. The prevalence among men was found to be 17.1% [95% CI: 12.8%-22.4%] and among women was found to be 27.3% [95% CI:18%-39%]. Figure 1 describes the prevalence of metabolic syndrome in the various age groups.

Univariable analysis for Correlates of Metabolic syndrome by simple logistic regression shows that presence of Mets is not associated with age, gender, presence of other co-morbidities or insulin use.

**Discussion:**

The major finding of the study was high prevalence of dyslipidemia and hypertension among a diabetic population. The current study provides

first estimates of prevalence of MetS in a diabetic population in this part of the country.

The current study shows that the prevalence of MetS is higher in females than in males, though the difference is not statistically significant. The result is coherent with other studies.[26,27] The reason is that women have low HDL and high waist circumference as compared to men (cut-offs values are different).[27]

Prevalence of dyslipidemia (57.7%) in current study was almost similar to that in another study (45-65%).[29] However the proportion of diabetic subjects having hypertension was much higher in the current study as compared to another one (75% vs 55.4%).[29]The most disturbing finding is the proportion of subjects who were either overweight or obese (88.3%). Obesity and hypertension among patients with T2DM in developing countries are even more harmful than in high-income countries[30], where access to health care and adequate prevention programs help manage cardiovascular risk factors[31] and can delay complications[32].

The prevalence of MetS among diabetic population has come out to be much lower than in studies done in other parts of the world (17% vs 77%).[27,33-36] The reason is the use of different criteria to define MetS in the current study. The number of subjects suffering from MetS has been limited in the current study because of the use of the essential criterion of central obesity. However, if BMI is to be considered the percentage of subjects suffering from MetS can go much higher. Alexander et al. reported that the prevalence of Coronary Heart Disease (CHD) is substantially higher in subjects with both diabetes and MS than in those with only diabetes.[37] In adults with T2DM, the presence of MetS was associated with a five-fold increase in cardiovascular risk independent of age, sex, smoking status, and glycated hemoglobin (HbA1c).[38]

The limitation of our study includes a small sample size and use of BMI as a proxy indicator of central obesity.

It is an important public health measure to know the proportion of the T2DM population at additional risk of complications from hypertension and obesity, as it helps to determine public and private resource requirements to reduce these risk factors or to care for patients after cardiovascular events.[30]

Therefore, it is imperative that aggressive therapy be aimed at controlling dysglycemia, dyslipidemia and hypertension. Substantial benefits of such a multifactorial intervention have been documented by the Steno-2 study.[39]

**Conflict of interest:** The authors declare that they have no conflict of interest.

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