

Prevalence of Metabolic Syndrome in Patients with Diabetes Mellitus Type 2 Attending Tribhuvan University Teaching Hospital

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BACKGROUND: Metabolic syndrome (Met S) is a cluster of biochemical and physical conditions that presage the development of atherosclerotic cardiovascular disease. Its association with diabetes mellitus has long been a topic of study. This study intends to find out the prevalence of Met S in Nepalese population using IDF criteria.

METHODS: This cross-sectional study was carried out in department of medicine and department of biochemistry, Tribhuvan University teaching hospital, Maharajgunj, Kathmandu. 204 diabetic subjects, with age ranging between 31 to 80 years and similar number of healthy controls were recruited for study. Demographic, anthropometric and biochemical data were obtained as per preformed profoma. Statistical analysis was done using SPSS statistical software version 17.0.

RESULTS: Prevalence of metabolic syndrome in diabetic population was found to be 67.3%, while it was only 7.84% in control group. Prevalence was found to be higher in females compared to males.

CONCLUSIONS: Prevalence of metabolic syndrome is significantly higher in diabetic subjects, making them highly prone to the ill effects of cardiovascular diseases.

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Introduction

The metabolic syndrome (Met S), also called insulin resistance syndrome or syndrome X, is a cluster of risk factors that is responsible for much of the excess cardiovascular disease morbidity amongst overweight and obese patients and those with Type 2 Diabetes Mellitus (T2DM) [1] Met S is associated with increased cardiovascular disease leading to increased cardiovascular (CV) morbidity and mortality [2-8] It is also an independent predictor of cerebrovascular events and is also related to an increased risk of all-cause mortality [3,5,7].

Among the various criteria employed for

detection of Met S, the one put forward by IDF is employed in this study.

IDF criteria for metabolic syndrome: [9]

Central Obesity as defined for Asian population (Waist Circumference ≥ 90 cm in men, ≥ 80 cm in women), together with two of the following:

Blood Pressure (Systolic blood pressure ≥ 130 mmHg, Diastolic BP ≥ 85 mmHg) or treatment of previously diagnosed hypertension

Fasting Plasma Glucose ≥ 5.6 mmol/L or previously diagnosed type 2 diabetes

HDL Cholesterol < 1.03 mmol/L in men, < 1.29 mmol/L in women

Triglycerides ≥ 1.7 mmol/L

In the last decade, Met S has garnered considerable interest due to its strong association with diabetes. Insulin resistance is presumed to play a major role, both in pathogenesis of diabetes mellitus and in the genesis of Met S. Evidence is accumulating that insulin resistance may be the common aetiological factor for the individual components of the Met S, although there appears to be heterogeneity in the strength of the insulin resistance relationship with different components between, and even within, populations [2, 10, 11]. Due to this relationship, it comes to us as no surprise that diabetes and Met S are closely associated.

Although the reported prevalence of Met S in general population differs widely among the ethnic groups [12, 13] and according to definition of Met S used [4, 14-16] the prevalence among diabetic population is very high, regardless of ethnicity and definition [3, 4, 17-19].

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It is essential to identify prevalence of Met S in diabetic patients without cardiovascular diseases (CVD) as diabetic patients with Met S have higher incidence of CVD than those without Met S [6, 19] and Met S is stronger risk factor for CVD in patients with T2DM than in nondiabetic patients [3]

Thus, this study aims to find prevalence of Met S in patients with T2DM.

Methods

This was a cross-sectional study conducted at Tribhuvan University Teaching Hospital, Maharajgunj, Kathmandu, from September 2011 to October 2012. The study was ethically approved by Institutional Review Board. Written consent was taken from every participant or visitors of participants, if participants were unable to do so.

A total of 204 subjects (102 males and 102 females), diagnosed with T2DM as defined by expert committee on diagnosis and classification of diabetes mellitus were enrolled in this study.

Participants were interviewed by asking the questions included in questionnaire. Variables as weight, height, waist circumference and blood pressure were measured. Five mL of blood was drawn after an overnight fast (8 -12 hours) by venous puncture. It was then analysed for glucose and lipid profile. Similar procedure was carried out with equal number of age and sex matched control group. Nondiabetic individuals, with no other chronic illness as Chronic kidney disease (CKD), CVD, and apparently healthy were recruited as controls.

IDF criteria were used to identify the subjects

with Met S. Statistical analyses were done by SPSS 17.0 version (Statistical Package for Social Science for Window version; SPSS, Inc., Chicago, IL).

Results

All together 408 subjects were enrolled in this study. Among them, 204 were diabetic individuals and equal number of healthy control was recruited. Among them, 102 were male and 102 were female in the diabetic group and same number of males and females in the control group. Mean age of cases was 54.42 ± 11.9 (range: 31-80 years) and that of control group was 54.43 ± 11.91 (range: 31-80 years). The Waist Circumference, Blood pressure (BP), Fasting Blood glucose (FBG), Total Cholesterol (TC), LDL-Cholesterol (LDL-C) and Triacylglycerol (TG) were found significantly higher in cases compared to control (Table 1).

Prevalence of Met S was found to be 63.7% in case group, while the prevalence of the same in normal control group was 7.84% (Figure 1).

Gender wise, metabolic syndrome showed comparatively high prevalence in females than in males. The percentage of diabetic females with Met S was 70.9%, while 55.1% of diabetic males had Met S (Figure 2).

Discussion

Various studies have demonstrated higher prevalence of Met S in diabetic population compared to normal individuals. Our study also supports this fact. In our study, 63.7% of case group were shown to have metabolic syndrome while the prevalence of the same in normal control group was 7.84%.

Table 1. Anthropometric and biochemical characteristics of cases and control

Parameter	Cases (Mean \pm S.D.)	Control (Mean \pm S.D.)	p value*
Waist Circumference (cms)	91.33 \pm 9.73	82.73 \pm 4.15	<0.001
BP (systolic) mmHg	122.35 \pm 8.57	116.10 \pm 6.83	<0.001
BP (Diastolic) mmHg	80.40 \pm 6.95	76.08 \pm 5.81	<0.001
FBG (mmol/L)	7.38 \pm 2.50	4.6 \pm 0.86	<0.001
TC (mmol/L)	5.15 \pm 1.98	4.20 \pm 0.76	<0.001
HDL-C (mmol/L)	0.99 \pm 0.19	1.01 \pm 0.19	0.42
VLDL-C (mmol/L)	0.98 \pm 0.39	0.79	0.14
LDL-C (mmol/L)	3.1 \pm 1.04	2.57 \pm 0.76	<0.001
TG (mmol/L)	2.16 \pm 0.88	1.35 \pm 0.36	<0.001

*Student's t-test was applied.

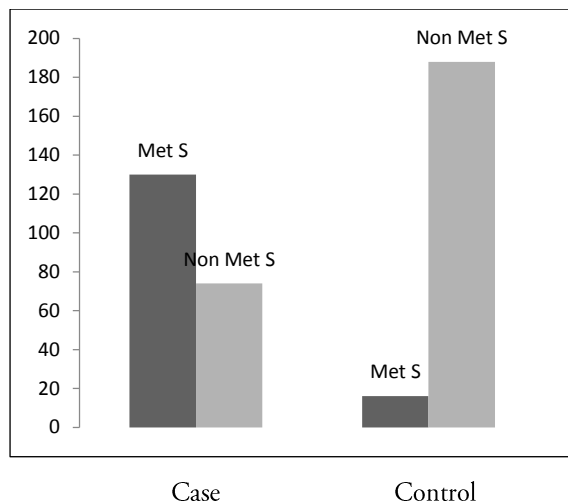


Figure 1. Prevalence of Met S in case and control.

A hospital based cross sectional study conducted in diabetes patients aged between 25-75 years of age presenting to Manipal Teaching Hospital, Pokhara also reported such higher prevalence. However, the prevalence of Met S in diabetic population in that study was comparatively higher than in ours. According to this study, the prevalence of Met S in diabetes patients as per NCEP/ATP III and IDF criteria were 71% (72% in males and 91% in females) and 82% (80% in males and 95% in females) respectively [20].

Similar kind of study was conducted in Pakistan. Out of the 100 participants seventy six (76%) were diagnosed to have Met S. Of the 56 females, forty eight (85.71%) were having Met S while twenty eight (63.63%) of the 44 male participants were having the syndrome. The difference was statistically significant ($p < 0.05$) [21]. Another study conducted on a large number of patients (5088; 2908 men and 2180 women) also concluded with similar findings. The prevalence of Met S in diabetic population in this study was found to be 77.2%. (87.71% in women and 69.33% in men). However, NCEP/ATP III criteria were used in this study to diagnose Met S [22].

A study carried out in Korea reported the prevalence of Met S in Korean type 2 diabetic patients to be 62.0% (53.7% in men and 68.9% in women). Total 989 Korean patients (452 men and 537 women, 59 ± 10 year of age) with type 2 diabetes were studied. The reported prevalence is moreover similar to that obtained in our study.

However, Met S was defined by NCEP-ATP III criteria or by modified NCEP-ATP III criteria which adopt the definition of abdominal obesity in Asia-Pacific region (M: >90 cm, F: >80 cm), in contrast to IDF criteria used in our study [23].

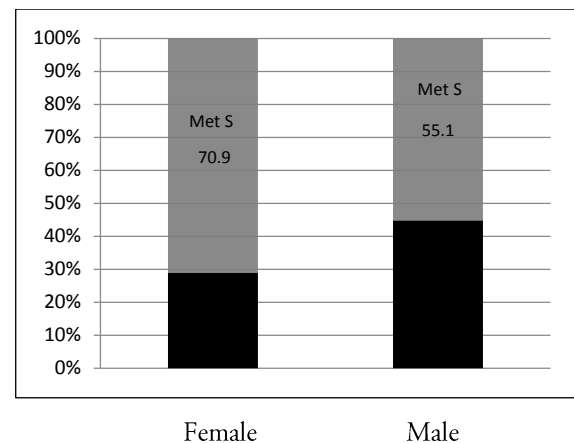


Figure 2. Genderwise prevalence of Met S.

Another inference that can be drawn from above studies, besides the high prevalence of Met S in diabetic population, is that gender wise, metabolic syndrome comparatively has high prevalence in female sex than in males. Similar reports are obtained by Kalish et al. [24], Sarrafzadegan et al. [25] and Rizwan et al. [26] Our study provides further support to this finding. In our study 55.1% of diabetic males had Met-S while 70.9% of diabetic females had Met S.

High prevalence of Met S in female can be related to increase obesity in female and lower level of physical activity and high calories food, and all these factors contributing to insulin resistance and Met S. The mechanism by which excessive body fat causes insulin resistance and impairs glucose metabolism is not clearly defined, but fat stores are an important cause of increased free fatty acid and triglyceride in the skeletal muscle, which impairs insulin secretion [27]. This could also 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.

Some other studies reporting higher prevalence of Met S in diabetic individuals are by Imam et al. [28] reporting a prevalence of 79.7% from Pakistan, Bruno et al. [29] reporting a prevalence of 75.6% from the USA, Foucan et al. [30] reporting a 77% prevalence of metabolic syndrome in diabetic Indian immigrants in the USA and Thanaa et al. [27], reporting 66.5% prevalence from Iraq.

Conclusion

Prevalence of metabolic syndrome is significantly higher in diabetic subjects, making them highly prone to the ill effects of cardiovascular diseases

Conflict of Interest: None declared.

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