

ORIGINAL ARTICLE

FREQUENCY AND RISK FACTORS OF METABOLIC SYNDROME
IN WOMEN WITH TYPE 2 DIABETES

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Background: ‘Metabolic disorder’ is defined as a group of metabolic risk factors, and its diagnosis requires at least three out of central obesity, elevated BP, elevated fasting plasma glucose (FBS), high serum triglycerides (TG), and low high-density lipoprotein (HDL) levels. The objective of this study was to assess the frequency and risk factors of metabolic syndrome (MetS) in type 2 diabetic female patients. **Methods:** This was a cross-sectional study carried out from January, 2015 to July, 2015. A total of 155 diabetic women aged 18–70 years were included using convenience sampling method. Detailed medical history, physical examination and laboratory assessment of fasting blood glucose, HbA1c, and lipid profile was completed for every patient. **Results:** The frequency of MetS was 96.1% in the studied diabetic women. Low HDL was the commonest component (98.5%) followed by hypertension (98.2%) and central obesity (95.9%). Central obesity, hypertension, raised TG, low HDL and high LDL were associated with the MetS. **Conclusion:** Frequency of MetS and all components of MetS were found very high in diabetic women. Prevention strategies for cardiovascular disease may be implemented through health education and prompt treatment to reduce the burden of complications.

Keywords: Metabolic syndrome (MetS), risk factors, type 2 diabetes, frequency

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INTRODUCTION

The term ‘Metabolic Disorder’ is defined as a group of metabolic risk factors, and its diagnosis requires at least three out of five of the following as indicated by National Cholesterol Education Program Adult Treatment Panel III (NCEP-ATP III): abdominal (central) obesity, elevated blood pressure (BP), elevated fasting plasma glucose (FBS), high serum triglycerides (TG) and low high-density lipoprotein (HDL) levels. The occurrence of metabolic syndrome (MetS) in people with diabetes increases the risk of coronary heart disease and stroke up to double. Risk increases when more components of metabolic syndrome are present.

Pathophysiology of metabolic syndrome is complex and multifactorial, and is still under investigation. Obesity, old age, sedentary life style, and insulin resistance are present in most of the patients with MetS. Other important factors that contribute in its pathophysiology are genetics, diet, medication for mood disorders/psychotropic conditions, and excessive alcohol intake. American Heart Association reported various components connected with MetS and diabetes including family history, smoking, physical latency, expending quick nourishments and high-sugar drinks, gestational diabetes, low conception weight and low financial status.¹

Pervasiveness of MetS will be expanding around the world that demonstrates that MetS will get to be a progressively basic issue previously, quite some time on hail. Twenty-five percent of European and 10–19% of Asian population is affected by MetS. In Pakistani population prevalence of MetS is 18%–46% while 46%–75% Pakistani patients with diabetes have

MetS.² The prevalence of MetS in type 2 diabetes according to WHO, NCEP-ATP III and IDF was 81.4%, 91.9% and 86.7% respectively.³ Many of the studies done in patients with T2DM had revealed high prevalence of metabolic syndrome and a significant majority of these were women rather than men.

In Pakistani population Diabetes, MetS and their associated risk factors are quite common. Data on potentially serious outcomes of both diseases is still lacking in Pakistan. This study was carried out to assess the frequency and associated risk factors of the metabolic syndrome in women with type 2 diabetes.

METHODS

This was a cross-sectional survey. A total of 155 diabetic women aged 18–70 years were recruited from Medical Unit III, Jinnah Postgraduate Medical Centre, Karachi, using convenience sampling method. Sample size was calculated using Raosoft calculator. Assuming margin of error 7%, response distribution 75%² and confidence level 95% yielded a recommended sample size 146. All patients signed the informed consent form after describing and understanding about the purpose and protocol of the study. Ethical approval was obtained from Institutional Review Board, Jinnah Postgraduate Medical Centre.

A detailed medical history including age, ethnicity, duration of diabetes, sedentary lifestyle, history of hypertension and physical examination were recorded for each participant. Height, weight, waist circumference (WC) and blood pressure was measured and recorded. Waist boundary was measured halfway between the last rib and the iliac peak at minimal inspiration. Body Mass Index (BMI) was calculated by

using the formula: weight (Kg)/[height (m)]². Blood samples for fasting plasma glucose (FPG), total cholesterol (TC), triglyceride (TG), low density lipoprotein cholesterol (LDL-C) and high density lipoprotein cholesterol (HDL-C) were taken after a 12 hours fasting. HbA1c levels were measured using A1C Now[®] (Bayer).

Data were entered into and analysed using SPSS-19. Qualitative variables were expressed as percentages and quantitative variables as Mean±SD.

RESULTS

Overall 155 type 2 diabetic women were incorporated into the study. There were 149 (96.1%) married and 6 (3.9%) unmarried subjects. The mean age of patients with MetS (n=149) was 51.59±8.94 years, and mean age of patients without MetS was 51.33±15.46 years. Sedentary life style was seen in 93.7% patients with MetS. The mean duration of diabetes reported by patients was 2.22±0.76 years. Good glycemic control of diabetes was found in only 41 (27.5%) patients.

Overall prevalence of metabolic syndrome was 96.1%. All patients belonged to different ethnic groups. Prevalence of MetS was 100% in Sindhi, Punjabi, Seraiki and Baloch women, 95.1% in Pushtoons, 94.2% in migrants, and 88.1% in others. The clinical and laboratory findings in patients are tabulated as Table-1.

Table-1: Clinical and laboratory findings of patients with MetS (n=149)

Findings	No. (%)
Central obesity	143 (95.9)
Hypertension	146 (98.2)
Raised TG	140 (94.3)
Low HDL	147 (98.5)
High LDL	140 (93.8)

Table-2 shows the comparison of various components of metabolic syndrome from some other studies. In our study the frequency and other components of metabolic syndrome were higher than other studies.

Table-2: Comparison of frequency of various constituents of metabolic syndrome in type 2 diabetic women with other studies

Parameter	This study	Ahmed N <i>et al</i> ⁶	Peer N <i>et al</i> ¹⁰	K Nasiah <i>et al</i> ¹²
Prevalence	96.1%	63.16%	43.5%	77.01%
Hypertension	98.2%	50%	46.3%	68.89%
Obesity	95.9%	71.43%	86%	87.67%
High TG	94.2%	66.67%	11.5%	75.51%
Low HDL	98.5%	68.75%	75.0%	77.42%

DISCUSSION

Metabolic syndrome is a group of risk factors of cardiovascular disease in an individual patient. These components include hypertension, dyslipidemia, central obesity and diabetes.⁴ Presence of two or more of these

risk factors confers a patient 2–6 folds increased risk of adverse cardiovascular events.⁵

Various studies around the globe have shown increasing prevalence of MetS in the world. All these studies show a higher prevalence of MetS in female gender than males. N Ahmed *et al* found a frequency of 84.7% in women and 44.3% in men.⁶ In a systematic review in Gulf Cooperation Council Countries, significant gender difference was found in MetS.⁷ Another study in KPK province of Pakistan showed that 85.7% women and 63.3% men with type 2 diabetes had MetS.⁸ Similar results are shown in studies from India, Iran, Spain and African countries.⁹ In this study, we studied type 2 diabetic women of different ethnic origins from a metropolitan city. The frequency of metabolic syndrome was found higher than other studies from Pakistan.

This higher prevalence in women may be multifactorial. Behavioural risk factors like sedentary life style, dietary factors and genetics might play role in causing increased prevalence of MetS in women. Multiparity may also contribute to central obesity in women. The factors leading to higher prevalence in our region may be related to sedentary life style, eating habits or genetic factors. In Punjabi and Sindhi origin patients we found prevalence of MetS to be 100%.

All components of MetS were found in significantly higher percentages in diabetic women. The most common component of MetS found in our patients was low HDL as compared to Peer *et al* and Ahmed *et al* studies.^{6,10} Low HDL (<40 mg/dl) is a self-determining risk factor of cardiovascular disease. In Qubec cardiovascular study it was shown that for every 10% reduction in HDL, rise in CVD risk was 13%.¹¹

Hypertension was present in 98.2% of patients in our study group as compared to Ahmed *et al* and Nasiah *et al*, who found prevalence of 50% and 68% respectively in diabetic women.^{6,12} Studies have shown higher prevalence of hypertension in Afro-Carrabin and south Asian population than whites. This may be due to genetic and environmental factors.

Abdominal obesity was identified a most common component of metabolic syndrome which was present in 95.9% of patients. Obesity is an important and frequently found modifiable component of MetS which also predispose patient to development of impaired glucose tolerance, diabetes, pro-atherogenic lipid profile and cardiovascular death. The effects of obesity and on health have been comprehensively discussed.^{13–17} Global Burden of Disease 2013 Study and other large collection studies showed a consistent risk of increasing BMI above 23,^{18–21} mainly for CVD, DM, OA, CKD and cancers. Ahmed *et al* reported 56% of patients with obesity in Type 2 Diabetic patients aged above 40 years.⁶

Our study has some potential limitations. This study may not represent a true sample of population because patients were recruited only from a diabetic clinic of tertiary care hospital and majority of patients were from urban area. Community based studies should be conducted to find out the true prevalence in our population. A causal relationship could not be established between diabetes and MetS.

CONCLUSION

Prevalence of MetS and all components of MetS were found high in diabetic women. Due to rapid urbanization, changes of life style, and lack of health awareness, the MetS is becoming a silent epidemic. The modifiable factors of MetS like increased BMI, central obesity and hyperlipidemia should be addressed. Hypertension management and good control of diabetes is mandatory to overcome the problem.

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