Original Article

Frequency of the Metabolic Syndrome In Type 2 Diabetic Subjects Attending The Diabetes Clinic Of Nishtar Medical College And Hospital, Multan

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ABSTRACT

Objectives: To determine the frequency of the metabolic syndrome in patients with type 2 diabetes mellitus who attended the diabetes clinic of Nishtar Medical College and Hospital, Multan. **Methods**: A cross sectional descriptive study was conducted at the diabetes clinic of Nishtar Medical College and Hospital, Multan from June 2010 to August 2010. 187 patients with type 2 diabetes were enrolled in the study. Frequency of metabolic syndrome was estimated according to the criteria proposed by American Heart Association/ National Heart, Lung and Blood Institute. **Results**: Total number of patients enrolled was 187 out of which, there were 67 male patients and 120 female patients. The mean age of the patients was 48 years and the range was 28 to 80 years. By applying American Heart Association criteria, metabolic syndrome was found in 65.2% type 2 diabetics, (43.31% women and 21.92% men) **Conclusion:** The frequency of the metabolic syndrome was found very high in our study. This was especially high in type 2 diabetic women at a frequency of 43.31%

INTRODUCTION

Although clustering of some metabolic abnormalities was recognized as early as 1923[1,] the coining of the term "syndrome X" in 1988 by Reaven [2] renewed the impetus to conduct research concerning this syndrome. In his description of syndrome X, Reaven considered the following abnormalities: resistance to insulin-stimulated glucose uptake, glucose intolerance, hyperinsulinemia, increased VLDL triglycerides, decreased HDL cholesterol, and hypertension. Other metabolic abnormalities that have been considered as part of the syndrome include abnormal weight or weight distribution, inflammation, microalbuminuria[1] hyperuricemia, and abnormalities of fibrinolysis and of coagulation.[3]

People with the metabolic syndrome are at increased risk for cardiovascular disease.[4]Because of the increased risk for morbidity and mortality associated with the metabolic syndrome, an understanding of the dimensions of this syndrome is critical both for allocating health care and research resources and for other purposes. [5] However, generating such estimates has been complicated by the use of many definitions of the metabolic syndrome, and no standard definition has been routinely used. The World Health Organization (WHO) initially proposed a definition for the metabolic syndrome in 1998[6]. Then, the Third Report of the National Cholesterol Education Program Expert Panel on Detection, Evaluation, and Treatment of High Blood Cholesterol in Adults (Adult Treatment Panel III [ATP III]) provided a new working definition of the metabolic syndrome[7]. Thus, prevalence estimates of the metabolic syndrome in the same population could differ depending on the definition used. More recently, a new criterion was proposed by the American Heart Association/National Heart, Lung and Blood Institute which define metabolic syndrome as fulfilling any three criteria from the following:

- Elevated waist circumference:
- Men — Equal to or greater than 40 inches (102 cm)
  - o Women — Equal to or greater than 35 inches (88 cm)

- Elevated triglycerides: Equal to or greater than 150 mg/dL (1.7 mmol/L)
- Reduced HDL ("good") cholesterol:
  - Men — Less than 40 mg/dL (1.03 mmol/L)
  - Women — Less than 50 mg/dL (1.29 mmol/L)
- Elevated blood pressure: Equal to or greater than 130/85 mm Hg or use of medication for hypertension
- Elevated fasting glucose: Equal to or greater than 100 mg/dL (5.6 mmol/L) or use of medication for hyperglycemia

It is not clear whether AHA/NHLBI intended to create another set of guidelines or simply update the NCEP ATP III definition. According to Scott Grundy, University of Texas Southwestern Medical School, Dallas, Texas, the intent was just to update the NCEP ATP III definition and not create a new definition. [8, 9] Since, the magnitude and seriousness of this problem has largely been underestimated in Pakistan, the aim of our study was to determine the frequency of the metabolic syndrome in type 2 diabetic patients. We can then estimate the scale of this serious global health issue in our setup and find out the ways and means to prevent this constellation of syndrome.

METHODS

This was a descriptive cross sectional study conducted at the diabetes clinic of Nishtar Medical College and Hospital, a tertiary healthcare centre in Multan, from June 2010 to August 2010. A total of 187 patients with type 2 diabetes were enrolled in the study. All type 2 diabetics with different ethnic backgrounds of the country were included in the study. Following variables were measured for the metabolic syndrome according to the American Heart Association/National Heart, Lung and Blood Institute guidelines, which define metabolic syndrome as fulfilling any three criteria from the following:

- Elevated waist circumference:
  - Men — Equal to or greater than 40 inches (102 cm)
  - Women — Equal to or greater than 35 inches (88 cm)
- Elevated triglycerides: Equal to or greater than 150 mg/dL (1.7 mmol/L)
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The parameters were calculated using the following methods:

1. Waist circumference was measured midway between iliac crest and lower rib margin
2. Blood pressure was measured using auscultatory method by a mercury sphygmomanometer with patient seated comfortably in outpatient setting.
3. Serum HDL-C and triglycerides were measured by enzymatic in vitro assay using Roche automated clinical chemistry analyzers.
4. Plasma glucose was estimated by hexokinase method using Roche chemical analyzers
5. Data analysis was performed using statistical programmes SPSS version 16.0.

ETHICS

- The procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation and with the Helsinki Declaration of 1975, as revised in 1983
- The names of patients, their initials or their hospital registration numbers have not been used

STATISTICS

- The data collected in the course of three months were entered on SPSS Version 16.0
- The data was analyzed and charts were created using the same software program following standard procedures

RESULTS

A total of 187 type 2 diabetic patients were included in the study in which 67 (35.83%) were males and 120 (64.17%) females. Mean age of study population was 48 years ranging from of 28-80 years. Of the total, 54.5% patients fulfilled the criteria for raised blood pressure; with 20.3% and 34.2% males and females respectively (Table1).

Table-1
Frequency of the components of the metabolic syndrome

Component	Total		Male		Female	
Diabetes type 2	187	100%	67	35.8%	120	64.2%
Hypertension	102	54.5%	38	20.3%	64	34.2%
Raised triglycerides level	128	68.4%	49	26.2%	79	42.2%
Low HDL level	52	27.8%	15	8.0%	37	19.8%
Elevated waist circumference	75	40.1%	11	5.9%	64	34.2%

It can also be seen from the table that 68.4% of the total patients fulfilled the criteria of raised triglycerides of which 26.2% were males and 42.2% females. Table 1 also shows that only 27.8% of the total patients (males – 8.0% and females 19.8%) had low levels of HDL. Around 40% of the total patients had raised waist circumference with over 2/3rd of them being females at 34.2%.

Table-2
Frequency of the metabolic syndrome according to AHA/NHLBI criteria

Total		Male		Female	
122/187	65.2%	41/187	21.9%	81/187	43.3%

Table 2 shows that when applying the American Heart Association/National Heart Lung and Blood Institute criteria, the frequency of metabolic syndrome in the study population was found out to be 65.2% with 21.9% being males and 43.3% females.

DISCUSSION

The present study provides an assessment of the prevalence of Metabolic Syndrome in type 2 diabetic patients using the American Heart Association criteria. The main finding of this study is that there is a high prevalence of Metabolic Syndrome in patients with type 2 diabetes at 65.2%.

Analyses have shown that metabolic syndrome as defined using AHA/NHLBI criteria are associated with the greatest increase in CVD prevalence[10].The incidence of the metabolic syndrome is increasing all over the world. One of the reasons could be due to significant increase in the prevalence of obesity[11]. High prevalence of insulin resistance, hyper triglyceridemia and excess body fat are considered to be some of the etiological factors of metabolic syndrome. High frequencies of these risk factors have been observed in Asians[12]. Furthermore, the prevalence of obesity is rising in developing nations like Pakistan[13]. In a study conducted in Liaquat National hospital, Karachi. There were 233 patients with type 2 diabetes mellitus. By applying NCEP-ATP III criteria, metabolic syndrome was found in 79.7%type 2 diabetics, (45.5% women and 34.3% men), by applying IDF criteria, metabolic syndrome was identified in 68.1% of type 2 diabetics (43.7% women and 24.4%. men)[14]. Mohsin etal conducted a study in PIMS, Islamabad. There were 106 patients, 91 (85.8%) had metabolic syndrome of whom 95% were females. Abdominal obesity was present in 91% females and 86% males. Low HDL levels were present in all females and 83% males. Seventy eight percent females and 63% males had elevated levels of triglycerides. Hypertension was present in 68% and 73% females and males respectively[15]. Studies conducted in other parts of the world estimated a prevalence of 70-80% among Caucasian type-2 diabetics6 and 75.6% among Chinese population with type-2 diabetes mellitus.[16] An Indian population based study using the Caucasian criteria for abdominal obesity, gave a prevalence of 76.3% among type2 diabetics.[17] Different studies report quite varied effects of gender on the metabolic syndrome in different populations. In USA, metabolic syndrome is more prevalent in white males than in females.[18] In American blacks, Mexican Americans, Korea, Iran, India, Oman, and Kinmen women had higher

prevalence of the metabolic syndrome than men.[19-22] We observed that metabolic syndrome was more common in females with type-2 diabetes mellitus as compared to their male counterparts. The higher percentage is also reported in Nigerian women with type-2 diabetes mellitus.[23] The reason may be a relatively sedentary lifestyle of women, in this part of the world, due to religious and social barriers.

Some less common risk factors for metabolic syndrome include prothrombotic and proinflammatory states, catecholamines[24] antiretroviral therapy[25].

The management of the metabolic syndrome is not specific to the syndrome, but comprises:

- Management of the underlying risk factors for CVD and diabetes
- Treatment of any established disease such as hypertension, heart disease, diabetes or chronic kidney disease.
- Evaluation and treatment of all CVD risk factors without regard to whether a patient meets the criteria for diagnosis of the metabolic syndrome.[26,27]

CONCLUSION

The frequency of metabolic syndrome is pretty high (65.2%) in type 2 diabetic patients presenting at the Diabetes Clinic in Nishtar Medical College and Hospital, Multan. Our study shows that the frequency is almost double in women (43.3%) compared to men (21.9%). All the risk factors were significantly more prevalent in women as compared to men. It would be reasonable to conclude that women are more likely to suffer from cardiovascular morbidity and mortality.

RECOMMENDATIONS

Life style modification including 30-60 minutes daily of moderate-intensity aerobic activity plus an increase in daily lifestyle activities have obvious benefits in the management of metabolic syndrome. Weight reduction is important for those with abdominal obesity and the metabolic syndrome. The initial aim is a slow reduction of 7-10% in baseline weight, with normal body mass index as the ultimate goal. The established view is that complex carbohydrates should form the major proportion of calories in the diet. Avoidance of transaturated fats

(often labeled as 'hydrogenated' or 'partially hydrogenated' vegetable oils) found in many margarines and processed foods and increasing the proportion of monounsaturated fats (e.g. olive oil) [28] is recommended. The manifestations and complications of metabolic syndrome should be treated according to established guidelines for the treatment of hyperlipidaemia, cardiovascular disease, hypertension and diabetes[26, 27]. This may therefore involve the use of: low-dose aspirin, antihypertensives, statins and/or fibrates and antidiabetic drugs. There is no specific drug treatment for the metabolic syndrome itself. Metformin, glitazones and acarbarose have been suggested as either improving the syndrome or delaying progression to type 2 diabetes, [29, 30] though recent safety concerns do not favour glitazones.

Regular follow-up to monitor progress is recommended to reduce cardiovascular risk[27].

REFERENCES

1. Kylin E. Studies of the hypertensionhyperglycemia-hyperuricemia syndrome (Studien ueber das hypertonie-hyperglyka¨mie-hyperurika¨miesyndrom.) Zentralblatt fuer Innere Medizin 44:105–127,1923
2. Reaven GM. Banting Lecture. Roleof insulin resistance in human disease. Diabetes 1988: 37:1595–1607.
3. Meigs JB. Invited commentary: insulin resistancesyndrome? Syndrome X? Multiple metabolic syndrome? A syndrome at al? Factor analysis reveals patterns in the fabric of correlated metabolic risk factors (Review). Am J Epidemiol 2000: 152:908–911.
4. Isomaa B, Almgren P, Tuomi T et al. Cardiovascular morbidity and mortality associated with the metabolic syndrome. Diabetes Care 2001: 24:683–689.
5. Earl S. Ford, Wayne H. Giles, A Comparison of the prevalence of the Metabolic Syndrome Using Two Proposed Definitions. Diabetes Care, 2003: 575-581.
6. Alberti KG, Zimmet PZ. Definition, diagnosis and classification of diabetes mellitus and its complications. Part 1. Diagnosis and classification of diabetes mellitus, provisional

report of a WHO consultation. Diabetes Med 1998: 15:539–553.

7. National Institutes of Health. Third Report of the National Cholesterol Education Program Expert Panel on Detection, Evaluation, and Treatment of High Blood Cholesterol in Adults (Adult Treatment Panel III). Executive Summary. Bethesda, MD, National Institutes of Health, National Heart, Lung and Blood Institute, 2001 (NIH publ. no. 01-3670).

8. Grundy SM, Brewer HB, Cleeman JI, Smith SC, Lenfant D, for the Conference Participants. Definition of metabolic syndrome: report of the National, Heart, Lung, and Blood Institute/American Heart Association conference on scientific issues related to definition. Circulation. 2004; 109: 433-438.

9. American Heart Association's description of Syndrome X

10. Prevalence of vascular disease in metabolic syndrome using three proposed definitions Vasilios G. Athyros a,b,c, Emmanuel S. Ganotakis b,d, Moses S. Elisaf b,e, , Evangelos N. Liberopoulos b,e, Ioannis A. Goudevenos c,f, Asterios Karagiannis a,b, for the GREECE-METS Collaborative Group.2007 25;117:204-10.

11. Elabbassi WN, Haddad HA. The epidemic of metabolic syndrome. Saudi MedJ 2005; 26: 373-5.

12. Misra A, Vikram NK. Insulin resistance syndrome (metabolic syndrome) and obesity in Asian Indians: evidence and implications. Nutrition. 2004; 20:482-91.

13. Stein CJ, Colditz GA. The epidemic of obesity. J Clin Endocrinol Metab 2005:89:2522-5.

14. Imam SK, Shahid SK, Hassan A, Alvi Z.Frequency of the metabolic syndrome in type 2 diabetic subjects attending the diabetes clinic of Liaquat National hospital, Karachi. 2007: 57:239.

15. Mohsin A, Zafar J, Nisar Y, Imran SM, Zaheer K, Khizar B Qazi RA. Frequency of the metabolic syndrome in adult type2 diabetics presenting to Pakistan Institute of Medical Sciences. 2007: 57:235.

16. Bruno G, Merletti F, Biggeri A, Bargero G, Ferrero S, Runzo C, et al: Metabolic syndrome as a predictor of all-cause and cardiovascular mortality in type 2 diabetes: the Casale Monferrato Study. Diabetes Care. 2004: 27: 2689-94.

17. Agrawal V, Bansal M, Mehrotra R, Hansa G, Kasliwal RR. Prevalence of Metabolic Syndrome and its Individual Components in an Asymptomatic Urban North Indian Population. Indian Heart J; 55, 2003.

18. Park YW, Zhu S, Palaniappan L, Heshka S, Carnethon MR, Heymsfield SB. The metabolic syndrome: prevalence and associated risk factor findings in the US population from the Third National Health and Nutrition Examination Survey, 1988-1994. Arch Intern Med; 2003: 163:427-36.

19. Chuang SY, Chen CH, Tsai ST, Chou P. Clinical identification of the metabolic syndrome in Kinmen. Acta Cardiol Sin 2002; 18:16-23.

20. Azizi F, Salehi P, Etemadi A, Zahedi-Asl S. Prevalence of metabolic syndrome in an urban population: Tehran Lipid and Glucose Study. Diabetes Res Clin Pract 2003:61:29-37.

21. Gupta A, Gupta R, Sarna M, Rastogi S, Gupta VP, Kothari K. Prevalence of diabetes, impaired fasting glucose and insulin resistance syndrome in an urban Indian population. Diabetes Res Clin Pract 2003: 61:69-76.

22. Park JS, Park HD, Yun JW, Jung CH, Lee WY, Kim SW. Prevalence of the metabolic syndrome as defined by NCEP-ATP III among the urban Korean population. Korean J Med 2002; 63:290-8.

23. Isezuo SA, Ezunu E. Demographic and clinical correlates of metabolic syndrome in Native African type-2 diabetic patients. J Natl Med Assoc 2005: 97:557-63.

24. Rapid responses to: editorials: Khunti K and Davies M: Metabolic syndrome; BMJ 2005; 331: 1153-1154.

25. Barbaro G, Barbarini G; Highly active antiretroviral therapy-associated metabolic syndrome and cardiovascular risk. Chemotherapy. 2006; 52:161-5.

26. Kahn R, Buse J, Ferrannini E, et al. The metabolic syndrome: time for a critical appraisal: joint statement from the American Diabetes Association and the European Association for

the Study of Diabetes. Diabetes Care. 2005: 28:2289-304.

27. Reaven GM. The metabolic syndrome: is this diagnosis necessary?; Am J Clin Nutr. 2006; 83:1237-47.
28. No authors listed, JBS 2. Joint British Societies' guidelines on prevention of cardiovascular disease in clinical practice. Heart. 2005;91-52.
29. SIGN guideline. Risk estimation and prevention of cardiovascular disease, Feb 2007.
30. Petersen JL, McGuire DK. Impaired glucose tolerance and impaired fasting glucose--a review of diagnosis, clinical implications and management. Diab Vasc Dis Res; 2005: 21:9-15.

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