FREQUENCY OF METABOLIC SYNDROME IN PATIENTS WITH DIABETES MELLITUS TYPE II

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ABSTRACT

Objective: To identify frequency of Metabolic Syndrome in diabetics and factors increasing risk of syndrome to avoid its prevalence.

Material &Methods: It is a prospective, descriptive, and cohort study conducted on 113 Diabetics of both sexes aged between 20 to 80 years to find out the frequency of Metabolic Syndrome under the criteria of Adult Treatment Panel III definition. Their anthropometric measurements, blood pressure, fasting blood glucose level and lipid profile were done and student's t-test was applied. Logistic regression analysis showed association of measured variables with the frequency of Metabolic Syndrome.

Results: Metabolic syndrome was found in 80 (males: 29, females: 51) patients (70.8%) out of 113. Individuals having hypertension, obesity and dyslipidemia along with Diabetes Mellitus were found to have Metabolic Syndrome more frequently than those having less of these complications.

Conclusion: The individuals with diabetes are more prone to the Metabolic Syndrome and the complications of Diabetes Mellitus. Moreover, Metabolic Syndrome diagnosis is simple and an easy clinical tool assessing potential risk of metabolic disorders and is found to be more common in individuals of old age group and its prevalence varies with the socioeconomic lifestyle.

Key Words: Metabolic Syndrome, T_2DM (Type 2 Diabetes Mellitus), Anthropometric Measurements, Fasting Blood Glucose levels, Lipid Profile.

INTRODUCTION

The metabolic syndrome (MS) was first described in 1998 by Reaven as "syndrome X".From the classical description by Reaven[1], a common nexus was established: insulin resistance/hyperinsulinemia. Surprisingly, this author did not include obesity in the definition. Later, other authors included the concept of alterations in fat, disorders of glucose, dyslipidemias and hypertension. Since epidemiological studies suggest that > 25% of the general population will gradually develop insulin resistance its diagnosed and treated increasingly within the ambit of PC[3-5] and, as such, has become included in the list of priorities of various public health-care authorities.

The metabolic syndrome has a multifactorial causation. The predominant underlying risk factors are obesity (especially abdominal obesity) and insulin resistance. These often occur together, and their relative contributions to the syndrome have not been fully defined. Nonetheless, there is a general agreement that the increasing prevalence of obesity in the Pakistan and worldwide is mainly responsible for the increasing occurrence of the syndrome. Other factors that can exacerbate the metabolic syndrome are physical inactivity, advancing age, endocrine dysfunction, and genetic susceptibility.

In 2001, the National Cholesterol Education Program Adult Treatment Panel III (ATP III) proposed that the metabolic syndrome be introduced into clinical practice as a risk companion to elevated LDL cholesterol (LDL-C)[7,8]. The concept of the syndrome presented in

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ATP III was based on more than 2 decades of research on the clustering of metabolic risk factors and it comes off to be the most frequently used criteria for MS. The syndrome was viewed as a clinical condition that is largely elicited by obesity and as one that deserves clinical intervention in practice. The rising prevalence of obesity in the United States was a major stimulus for including the metabolic syndrome as a component of the cholesterol guidelines. For routine practice, simple clinical criteria were proposed for a clinical diagnosis of the syndrome. Diagnosis was based on the identification of at least 3 of 5 risk factors: increased waist circumference (abdominal obesity), increased serum triglyceride, reduced HDL cholesterol (HDL-C), elevated blood pressure, and elevated baseline glucose.

MATERIAL AND METHODS

This was a Prospective, descriptive, multi-centered cohort study where a survey was carried out at an outpatient medical department of three hospitals of Faisalabad and Sargodha. A total of 113 diabetic patients of both genders were taken for random sampling aged between 20 to 80. 40 patients were analyzed from OPD of National Hospital FSD and 22 from Ahmad Polyclinic SGD and 51 from Rasheed Hospital SGD. All diagnosed patients of T2DM were selected for the study between the ages of 20 and 80. Diabetes mellitus was determined according to the answers of responders to the American Diabetes Association guidelines[20] which were used to establish the diagnosis of diabetes (Fasting glucose levels ≥110 mg/dl). whereas T1DM, patients with age less than 20 years and above 80 years, hospitalized patients with macro-vascular complications of diabetes i.e. stroke, acute myocardial infarction and renal failure, physically handicapped patients i.e. patients who are wheelchair bound and have joint problems/arthritis were excluded Material & Methods.

Arterial blood pressure was measured three times with an accuracy of 2 mm using a mercury sphygmomanometer, and with patients in sitting position and each value after an interval of two minutes and the average values were used for the analysis. Waist circumference was measured by a measuring tape by placing it midway between anterior superior iliac spine and the costal margins. Laboratory analyses and Biochemical analyses were done for responders (fasting for at least for 12 hours) on an empty stomach. Concentration of glucose in capillary blood was determined and lipid profile was assessed in venous blood enzymatically

The criteria defining Metabolic Syndrome according to the National Cholesterol Education Program-Adult Treatment Panel III require a combination of at least 3 of the 5 following criteria:

— Abdominal circumference ≥102 cm in males or ≥88 cm in females.

— HDL cholesterol < 1.03 mmol/mL (< 40 mg/dL) [males] or < 1.3 mmol/mL (< 50 mg/dL) [females].

— Triglycerides ≥ to 1.7 mmol/mL (≥150 mg/dL).

— Blood pressure ≥ 130/85 mmHg or the patient receiving hypotensive treatment.

— Baseline glycemia > 6.1 mmol/mL (> 110 mg/dL).

The patients who fulfilled the NCEP criteria for Metabolic Syndrome were entered as those having Metabolic Syndrome.

RESULTS

One hundred and thirteen patients were included in the study. The min age taken was 30 and max observed was 77years. The mean age came to be 51.73 ± 0.892. 52 of the individuals were males (46.017%) and 61 were females (53.98%). MS was seen in 80 subjects (70.8%) while 33 diabetics did not suffer from MS (29.2%). Out of the 80 ones having MS 28 subjects (24.8%) fulfilled 3 out of 5 criteria taken as per ATP definition, 35 were seen to fulfill 4 out of 5 (31.0%) and 17 fulfilled all of the 5 criteria (15.0%).

The mean waist circumference (inches) was 40.059 ± 0.326 showing abdominal obesity. The mean systolic and diastolic blood pressure (mmHg) was 131.42 ± 1.373 and 86.68 ± 0.912 respectively. The mean HDL (mg/dl) was 43.28 ± 0.719.

Number of patients having M.S(Metabolic Syndrome) and fulfilling the ATP(Adult Treatment Panel) criteria. Proposed mechanisms for development of metabolic syndrome.[14]

DISCUSSION

Metabolic Syndrome is a cluster of disorders. Insulin resistance is the main pathophysiologic feature of the metabolic syndrome. Several mechanisms connect
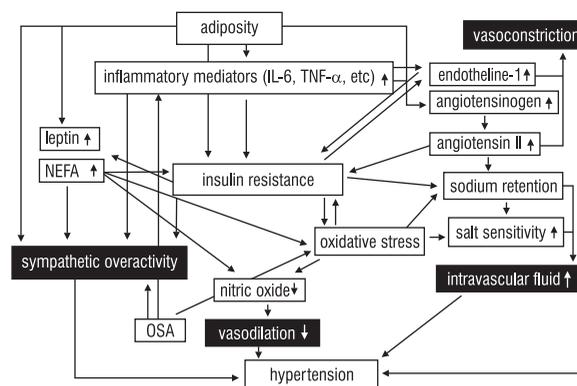
Table 1

	Mean	Standard Deviation	Variance	p-value
Age	51.73 ± 0.892	9.483	89.929	>0.05
Waist Circumference (inches)	40.06 ± 0.326	3.462	11.984	>0.05
Systolic B.P (mmHg)	131.42 ± 1.373	14.600	213.156	>0.05
Diastolic B.P (mmHg)	86.68 ± 0.912	9.697	94.023	>0.05
HDL (mg/dl)	43.28 ± 0.719	7.640	58.366	>0.05

Table 2: Biostatistics of different variables

Total number of patients	113
Diabetics with M.S	80
Diabetics without M.S	33
3 ATP criteria's fulfilled	28
4 ATP criteria's fulfilled	35
5 ATP criteria's fulfilled	17

Table 3: Number of complication seen in 113 patients

Diabetic Neuropathy	2
Diabetic Foot	8
Diabetic Carbuncle	1
Diabetic Ketoacidosis	3
Hypertension	22

insulin resistance with hypertension in the metabolic syndrome. Insulin resistance is associated with obesity, glucose intolerance anddyslipidemia.The dyslipidemia of insulin resistance includes high triglycerides and ApoB, low HDL and apoA1 and increased hepatic lipase activity

Previous studies state an anti-natriuretic effect of insulin[10-12]. This antinatriuretic effect is preserved, and may be increased in individuals with insulin resistance, and this effect may play an important role for development of hypertension in the metabolic syndrome[13]. So, Hypertension and dyslipidemia were found to be the most common problems amongst the diabetic Metabolic Syndrome individuals. 22 patients out of 113 were hypertensive and 17 had poor lipid profiles.

The Metabolic Syndrome individuals who suffer from Diabetes Mellitus type 2 get more complications as compared to diabetics having no Metabolic Syndrome (63.9% vs. 46.6%). Similarly patients with Metabolic Syndrome get more complications as compared to those having no Metabolic Syndrome (17.2 % vs. 8.9%)[21,22,23]. We found that patients with more complications of diabetes were more prone to fulfilling the criteria of Metabolic Syndrome. Two individuals showed off diabetic neuropathy, eight were found to be having diabetic foot, one female had diabetic carbuncle and three came with complaint of Diabetic ketoacidosis.

Accumulated visceral adipose tissue produce and secrete a number of adipocytokines, such as leptin, tumor necrosis factor-α (TNF-α), interleukin-6 (IL-6), angiotensinogen, and non-esterified fatty acids (NEFA), which induce development of hypertension[24]. Visceral Obesity has been suggested to play a fundamental role in the simultaneous development of Hyperglycemia, Hyperlipidemia, and hypertension. Visceral obesity is the main cause of the metabolic syndrome, and is associated with development of hypertension in the metabolic syndrome via a variety of pathways.

Previous reports in the literature state that prevalence of the metabolic syndrome increased with age[25,26]. The age group of 46-60 years showed a frequency of 50 patients with fourteen patients fulfilling three criteria, twenty seven patients fulfilling four criteria and nine patients showed all five criteria's of Metabolic Syndrome. It was evident that the frequency of Metabolic Syndrome increases with age. As expected, the prevalence of the metabolic syndrome varied by age group. We found that the prevalence of the metabolic syndrome increased with age irrespective of the definitions used. The highest prevalence of the metabolic syndrome (irrespective of definition) was recorded in men and women aged 46-60 years.

The authors of some studies[27-30] suggested that life-course socioeconomic position appeared to be an important confounder in the association of the metabolic syndrome with diabetes. In our study, the impact of the socioeconomic status on the Metabolic Syndrome and diabetes was not analyzed directly, yet, our data specified some of the features. People from better socio-economic position were more prone to visceral obesity while people from unstable background have a greater risk of being malnourished and less likely to develop visceral obesity. Therefore, increasing recognition of risk levels in the population with a simple focus on waist size and hypertension, along with corrected lifestyle habits

(smoking, physical activity, healthy nutrition habits), are important steps in addressing the metabolic problems.

CONCLUSION

Among type 2 diabetics more female patients suffer from metabolic syndrome,and have potentially increased risks of developing complications of diabetes including all the cardiovascular events as well and vice versa.

RECOMMENDATIONS

Recognition of metabolic syndrome and it's prompt management can help preventing complications in diabetic patients. The diagnosis of Metabolic syndrome can be considered as a tool in risk assessment of complications development in diabetic patients. Prevention of complications in type 2 diabetic patients can increase both the quality and quantity of life of such patients. So,this problem needs proper adressal and policies should be made to halt the development of Metabolic syndrome by proper health education of the patients regarding this serious health issue and providing them enough facilities and help to adapt to a healthy lifestyle. As complications of diabetes mellitus type 2 and metabolic syndrome can ultimately be lethal.

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AUTHOR'S CONTRIBUTION

Following authors have made substantial contributions to the manuscript as under:

Paracha M: Main idea.

Iqbal MH: Data Collection & Typing

Sarfraz K: Bibliography & Statistics

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.