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Original Research Article

A Study on the Evaluation of Elevated Serum Triglyceride the Strongest Single Indicator for the Presence of Metabolic Syndrome in Type 2 Diabetes Mellitus Patients

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Abstract

Objectives: This study was to evaluate the elevated serum triglyceride the strongest single indicator for the presence of metabolic syndrome in type 2 diabetes mellitus patients.

Methods: All the enrolled patients were divided into two groups (group A & group B). Group A included metabolic syndrome and group B included non-metabolic syndrome patients. A complete assessment like as detailed medical history, demography and physical examination. Anthropometric parameters such as BP by sphygmomanometer, waist circumference by measurement tape in cms or inches were performed. Blood samples were obtained for testing of blood sugar, lipid profile, liver and renal function. Metabolic syndrome was diagnosed using modified National educational program adult treatment panel-III NCEPATP-III criteria.

Results: A total of 200 type 2 diabetes patients with age group 40 to >70 years were included. Majorities of patients were in age group of 50 to 60 years. 130(65%) patients were males and 70(35%) were females. Prevalence of metabolic syndrome was 110(55%). When compared mean ± S.D of WC and triglyceride levels between metabolic syndrome and non-metabolic syndrome patients respectively. P-value was found to be 0.0001. which is highly significant differences.

Conclusions: Preponderance of metabolic syndrome was higher in type 2 mellitus patients. Elevated triglyceride levels and increased waist circumference were the most common predictors of metabolic syndrome in type 2 diabetes mellitus patients.

Keywords: Type 2 diabetes mellitus, Metabolic syndrome, Triglyceride.

Introduction

Metabolic syndrome is a cluster of metabolic abnormalities, characterized as central obesity, elevated blood pressure, dysglycemia, elevated triglyceride (TG) levels, and low high-density lipoprotein cholesterol (HDL-C) levels. The prevalence of Metabolic syndrome is high

in type 2 diabetes [1,2]. Metabolic syndrome increases the risk of atherosclerotic vascular disease in type 2 diabetes. In two prospective studies, Metabolic syndrome at baseline is associated with an increased risk of incident cardiovascular disease [3]. Metabolic syndrome also increases the risk of stroke and is associated with stroke recurrence in type 2 diabetes [4].

Most patients with diabetes have metabolic syndrome with estimated prevalence of 69.9 % for whites, 64.8 % for blacks and 62.4 % for Mexican Americans. Type II DM is a significant risk factor for coronary heart disease (CHD) and stroke. At least 65% of people with Type II DM die of some form of heart disease and stroke [5].

Patients with type 2 diabetes already fulfil one of the NCEP ATP III or IDF diagnostic criteria, while at least two more are required for the confirmation of NCEP ATP III/M. S diagnosis, and necessarily abdominal obesity plus one additional criterion for the IDF/MS diagnosis [6]. Several studies have investigated the role of each of the metabolic syndrome components in modifying cardiovascular risk in patients with type 2 diabetes [7]. Objectives of our study was to evaluate the elevated serum triglyceride the strongest single indicator for the presence of metabolic syndrome in type 2 diabetes mellitus patients.

Materials & Methods

This present study was conducted in Department of Pharmacology, with the collaboration of Department of Medicine and Biochemistry, Jawahar Lal Nehru Medical College, Bhagalpur, Bihar during a period from January 2020 to October 2020. Entire subjects signed an informed consent approved by institutional ethical committee, of Jawahar Lal Nehru Medical College, Bhagalpur was sought. Data was collected with irrespective of sex by the use of random sampling methods. A total of 200 type 2 diabetes mellitus patients with age group 40 to ≤ 70 years were enrolled in this study.

Patients with liver disorder, renal disorder, alcohol consumption, Cushing syndrome, estrogens/ OCP Administration & Acute Pancreatitis were excluded from the study.

Methods

All the enrolled patients were divided into two groups (group A & group B). Group A included metabolic syndrome and group B included non-metabolic syndrome patients. A complete assessment like as detailed medical history, demography and physical examination. Anthropometric parameters such as BP by sphygmomanometer, waist circumference by measurement tape in cms or inches were performed. Blood samples were obtained for testing of blood sugar, lipid profile, liver and renal function. Metabolic syndrome was diagnosed using modified National educational program adult treatment panel-III NCEPATP-III criteria.

Table 1: ATPIII Clinical Identification of the Metabolic Syndrome

Risk Factor	Defining Level
Men (Waist Circumference)	> 102 cm (>40 in)
Women (Waist Circumference)	> 88 cm (> 35 in
Triglycerides	> 150 mg/dl
Men (HDL Cholesterol)	< 40 mg/dl
Women (HDL Cholesterol)	< 50 mg/dl
Blood Pressure	> 130/>85 mm hg
Fasting Glucose	> 110 mg/dl

Criteria for Clinical Diagnosis of Metabolic Syndrome ATPIII When 3 of 5 of the above listed characteristics shown in Table 1 are present, a diagnosis of metabolic can be made.

Statistical Analysis

Data was analysed by using SPSS software. Mean ± Standard deviation were calculated. Independent sample t- test was applied. P value was taken less than or equal to 0.05 ($p \leq 0.05$) for significant differences.

Observations

A total of 200 type 2 diabetes patients with age group 40 to >70 years were included. Majorities of patients were in age group of 50 to 60 years. 130(65%) patients were males and 70(35%) were females.

Table 2: Comparison of variable between metabolic syndrome and non-metabolic syndrome in type 2 diabetes mellitus patients.

Variables	Mean ± S.D		T-statistics	P-value
	Group A: MS (N-110)	Group B: NMS (N=90)		
Age	52.34 ± 10.12	53.67±11.54	0.868	0.386
SBP	124±26.23	128± 14.78	1.289	0.199
DBP	85.67±13.89	81.76±14.56	-1.938	0.054
Waist circumference	92.12±6.92	87.34±7.18	-4.778	<0.0001
Triglyceride	183.65±84.54	134.92±50.21	-4.816	<0.0001
HDL-C	43.12± 5.96	44.67±5.97	1.828	0.069

When we compared the mean ± S.D of age, SBP and HDL-C between metabolic syndrome and non-metabolic syndrome patients respectively. P-value was found to be greater than 0.05. which is nonsignificant difference. Similarly, when compared mean ± S.D of DBP between metabolic syndrome and non-metabolic syndrome, p- value was found to be 0.05, which is significant difference. And when compared mean ± S.D of WC and triglyceride between metabolic syndrome and non-metabolic syndrome patients respectively. P-value was found to be very less than 0.05. which is highly significant differences.

Discussions

The identification of patients with MS among patients with type 2 diabetes is of great importance, since this population carries a cluster of cardiovascular risk factors and should be urged to show major compliance to their therapeutic regimen. The recognition of a single parameter with high efficiency in predicting MS in patients with type 2 diabetes was the primary aim of our study [8].

Elevated triglyceride levels usually are seen with other metabolic abnormalities associated with increased CVD risk. Factors contributing to elevated serum triglycerides are overweight, physical inactivity, excess alcohol intake, presence of the metabolic syndrome or type 2 diabetes mellitus, as well as certain genetic disorders [familial hypertriglyceridemia (FHTG), familial combined hyperlipidemia (FCHL), and familial dysbetalipoproteinemia] [9]. Frequently, hypertriglyceridemia is a result of a combination of genetic factors and other causes of increased secretion or impaired clearance of triglyceride rich lipoproteins. Based on the NCEP ATP III classification, the prevalence of hypertriglyceridemia is high in adults as well as in youth and adolescents, reflecting a population

increase in body weight and obesity during the past several decades [9].

Prevalence of MS in patients with type 2 diabetes is considerably high (70–92%), as reported by several studies using either NCEP ATP III or World Health Organization (WHO) criteria [7,10,11]. In their study patient population, the estimated prevalence of MS was similarly high as expected (72.8% based on the NCEP ATP III criteria and 81.6% based on the IDF criteria) [8].

In this present study, A total of 200 type 2 diabetes patients with age group 40 to ≤ 70 years were included. 130(65%) patients were males and 70(35%) were females. Out of 200 cases, 110(55%) type 2 diabetes mellitus patients had metabolic syndrome. Among them, 55(50%) most of the patients were in age group of 50 to 60 years.

Hypertriglyceridemia is one of the components of the metabolic syndrome, a constellation of metabolic risk factors including a central distribution of adiposity or visceral obesity, insulin resistance, impaired glucose tolerance, hypertension, and high triglycerides and/or low HDL-C, associated with an atherogenic, procoagulant, and proinflammatory state [12].

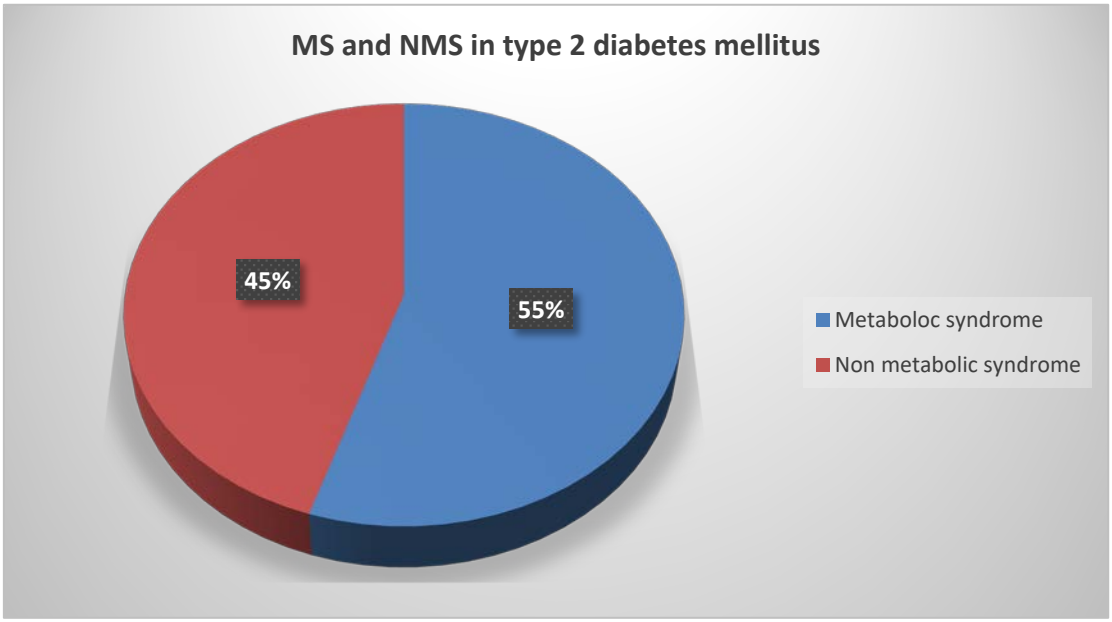

Figure 1: Showing the distribution of type 2 diabetes mellitus patients.
Out of 200 type 2 diabetes mellitus patients, 110(55%) patients had metabolic syndrome and 90(45%) patients had non metabolic syndrome.

The five components that form the criteria for defining the metabolic syndrome are triglycerides above 150 mg/dl; HDL-C below 40 mg/dl in men or below 50 mg/dl in women; blood glucose above 100 mg/dl; blood pressure above 130 mm Hg systolic or above 85 mm Hg diastolic; and waist circumference greater than 102 cm in men or greater than 88 cm in women [13]. A lower criterion for waist circumference is recommended for Asian populations. Three of these five criteria are needed to make the diagnosis of metabolic syndrome. Genetic and environmental factors appear to affect the distribution of these variables in both normal individuals and those with the metabolic syndrome. Type 2 diabetes mellitus, polycystic ovary syndrome, and FCHL may account for at least 40 –50% of

premature coronary artery disease in some populations with metabolic syndrome, and they need to be considered in assessing the risk of CVD in patients who have the metabolic syndrome [13].

In this present study, a highly significant (p=0.0001) mean differences of triglyceride was seen in between metabolic syndrome (group A) and non-metabolic syndrome (group B) patients. Similarly, mean differences of waist circumference between metabolic syndrome and non-metabolic syndrome was also highly significant differences (p=0.0001). Mean differences of diastolic blood pressure between group A and group B patients was little significant. While others variables like Age, SBP, HDL-C were not statistically significant difference (P>0.05) between metabolic syndrome and non-metabolic syndrome patients.

Conclusions

This present study concluded that the preponderance of metabolic syndrome was higher in type 2 mellitus patients. Elevated triglyceride levels and increased waist circumference were the most common predictors of metabolic syndrome in type 2 diabetes mellitus patients,

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