Original Research Article

STUDY OF LIVER ENZYME PANEL IN PATIENTS WITH METABOLIC SYNDROME

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ABSTRACT

Introduction: The term "metabolic syndrome" (MetS) refers to a group of symptoms that can include elevated blood pressure, hyperglycemia, excess body fat around the waist, and abnormal cholesterol levels. These conditions can occur in combination and increase the risk of heart disease, stroke, diabetes, insulin resistance, and nonalcoholic fatty liver disease (NAFLD). An estimated 34% of adults in the United States have MetS, according to the Third National Health and Nutrition Examination Survey. The present study is aimed to assess liver enzymes aspartate transaminase, alanine transaminase, gamma glutamyl transaminase and alkaline phosphatase in patients with metabolic syndrome and healthy controls.

Results: In the present study it is found that the mean age of the patients were 41.4 ± 10.4 years in healthy controls and 42.9 ± 9.8 years in MetS group. Out of 50 healthy controls 34 were males and 16 were females and in MetS group 36 were males and 14 were females. There were 64% current smokers, 16% ever smokers and 10% never smoked in healthy and in MetS group 64% were current smokers, 16% ever smokers and 20% never smokers as presented in Table 1. The mean levels of SBP, DBP, Fasting plasma glucose, alanine transaminase, aspartate transaminase, gamma glutamyl transferase and alanine transaminase were elevated in MetS group as compared to healthy controls and the elevation was statistically highly significant.

Conclusion: In conclusion, our determined that the liver enzyme levels are indeed associated with the MetS risk, both in overall populations and in subjects with liver enzymes within-normal-limits. The assessment of liver enzymes can be used a clinical predictors of MetS.

Key-Words: metabolic syndrome, liver enzymes, alanine transaminase, aspartate transaminase and gamma glutamyl transferase.

INTRODUCTION

The term "metabolic syndrome" (MetS) refers to a group of symptoms that can include elevated blood pressure, hyperglycemia, excess body fat around the waist, and abnormal cholesterol levels. These conditions can occur in combination and increase the risk of heart disease, stroke, diabetes, insulin resistance, and nonalcoholic fatty liver disease (NAFLD) [1-4]. An estimated 34% of adults in the United States have MetS, according to the Third National Health and Nutrition Examination Survey [5]. Abdominal obesity appears to be the main underlying risk factor for the s MetS [6–8]. Nonetheless, not all fat people get the syndrome, and insulin resistance—which has a strong correlation with MetS—can occur in lean people as well [9]. The MetS can be clinically manifested in a variety of ways, which brings some difficulties for the clinical diagnosis of MetS. Recent

experimental and clinical studies showed that liver enzymes might be novel candidate biomarkers for MetS and its clinical outcomes [10–13].

AIM AND OBJECTIVES

The present study is aimed to assess liver enzymes aspartate transaminase, alanine transaminase, gamma glutamyl transaminase and alkaline phosphatase in patients with metabolic syndrome and healthy controls.

METHODOLOGY

A cross-sectional comparative study was conducted in the department of general medicine in association with department of Biochemistry. We included patients diagnosed with metabolic syndrome and healthy controls.

Study design: Cross-sectional study

Sample size: 50 per group

Inclusion criteria: In this present study we included 50 subjects diagnosed with metabolic syndrome and 50 healthy controls in the age group 20-60 years willing to give voluntary consent to participate in the study. The MetS was defined using the modified National Cholesterol Education Program/Adult Treatment Panel III criteria for Asian Americans as having ≥3 of the following components [6]: waist circumference ≥90 cm in men or ≥80 cm in women; triglycerides ≥1.7 mmol/L; HDL cholesterol <1.03 mmol/L in men or <1.30 mmol/L in women; blood pressure ≥130/85 mm Hg or taking antihypertensive medications; or fasting glucose ≥5.6 mmol/L, or taking antidiabetic medications.

Data collection and biochemical analysis

The waist circumference (WC) was measured at a level midway between the lowest lateral border of the ribs and the uppermost lateral iliac crest in standing position. Blood pressure was measured manually by a calibrated aneroid sphygmomanometer. The mean of all three values were used as the systolic (SBP) and diastolic blood pressure (DBP). Plasma fasting glucose, total cholesterol, high-density lipoprotein (HDL) cholesterol, low-density lipoprotein cholesterol, triglycerides, and liver enzymes were measured enzymatically on an automatic analyser.

Statistical analysis

All data was summarized as mean (standard deviation [SD]) for the continuous variables and as number of patients (expressed as a percentage) in each group for the categorical variables. Characteristics of the study population between MetS subjects and healthy controls were compared using the t test and chi-square test as appropriate.

RESULTS

In the present cross-sectional study, we included 50 subjects with MetS and 50 healthy controls. Table 1 represents the demographic profile of the subjects.

Table 1: Demographic profile of study subjects		
	Healthy Controls	MetS
Age	41.4 ± 10.4	42.9 ± 9.8
Gender		
Males	34 (68%)	36 (72%)
Females	16 (32%)	14 (38%)
Smoking status		
Never	10 (20%)	9 (18%)
Ever	8 (16%)	6 (12%)
Current	32 (64%)	35 (70%)
Drinking		
Never	8 (16%)	10 (20%)
Ever	12 (24%)	8 (16%)
Current	30 (60%)	32 (64%)

Table 2: Liver Enzyme Panel in MetS and Healthy Controls		
	Healthy Controls	MetS
Systolic Blood Pressure	112.6 ± 14.6	138.2 ± 17.5*
Diastolic Blood Pressure	70.42 ± 12.2	88.5 ± 12.2*
Fasting Plasma Glucose	88.24 ± 6.42	126 ± 10.46*
ALT	22.23 ± 10.12	33.21 ± 12.34*
AST	18.98 ± 12.24	29.87 ± 9.86*
GGT	25.68 ± 21.82	46.43 ± 24.65*
ALP	79.86 ± 21.24	90.68 ± 22.18*

DISCUSSION

In the present study it is found that the mean age of the patients were 41.4 ± 10.4 years in healthy controls and 42.9 ± 9.8 years in MetS group. Out of 50 healthy controls 34 were males and 16 were females and in MetS group 36 were males and 14 were females. There were 64% current smokers, 16% ever smokers and 10% never smoked in healthy and in MetS group 64% were current smokers, 16% ever smokers and 20% never smokers as presented in Table 1. The mean levels of SBP, DBP, Fasting plasma glucose, alanine transaminase, aspartate transaminase, gamma glutamyl transferase and alanine transaminase were elevated in MetS group as compared to healthy controls and the elevation was statistically highly significant as represented in Table 2.

Nonalcoholic fatty liver disease (NAFLD) has recently been identified as one of the primary causes of MetS, diabetes, and cardiovascular illnesses [14]. MetS can also raise the risk of diabetes and cardiovascular disorders [15, 16]. It is possible to speculate that liver enzymes could be novel candidate biomarkers for MetS and associated clinical effects given that blood biomarkers of liver enzymes are sensitive in the identification of NAFLD. It may be possible to use GGT and ALT to forecast the accumulation of fat in liver cells and, consequently, to spot changes in visceral fat [17]. Inactivating PPAR led to changes in visceral fat, which were subsequently accompanied by MetS, insulin resistance, atherosclerosis, and other cardiovascular conditions [18].

In the study conducted by Lu Z et al. included reasonably high sample size (6,268 MetS individuals and 6,330 healthy controls) to evaluate the levels of liver enzymes (ALT, AST, GGT, and ALP) between the healthy population and subjects with MetS. Using the quartile technique and a continuous unit of liver enzymes, the ORs values and associated confidence intervals (95% CI) were determined. The findings further demonstrated the connection between liver enzyme levels and the likelihood of developing metabolic syndrome by demonstrating that patients with metabolic syndrome had significantly higher liver enzyme levels than the general population. All of the study participants were simultaneously categorized based on their gender [19].

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