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FASTING BLOOD GLUCOSE LEVELS IN PATIENTS WITHACUTE CORONARY SYNDROME

Internal Medicine

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ABSTRACT

Background: Diabetes is one of the independent risk factors that play an important role in the development of cardiovascular diseases. In the present study, the effect of fasting blood glucose levels in diabetic and nondiabetic patients on the mortality of patients admitted to coronary intensive care units with the diagnosis of acute coronary syndrome during hospitalization has been investigated.

Methods: Overall 280 (100 female, 180 male) patients admitted to coronary intensive care unit with the diagnosis of acute coronary syndrome were included in the present study. Files of patients were surveyed retrospectively. Patients whose fasting blood glucose level had been recorded were evaluated. The others were excluded from the study. Incuded patients were divided into two groups. i.e. patients whose FBG level was equal to or over 100 mg/dl and those whose levels were below 100 mg/dl. The relation between inhospital mortality of patients and age, HT, blood urea, creatinine, potassium, lipid levels and stasis findings along with fasting blood glucose levels was evaluated statistically.

Results: A significant relation was found between first fasting blood glucose level following admission and inhospital mortality (p=0.004). When the patients were divided into two groups i.e. patients whose blood glucose level was under 100 mg/dl and those whose FBG level was at or over 100 mg/dl, inhospital mortality was found to be significantly higher in the latter group (p=0.020).

Conclusion: In patients with acute coronary syndrome, hypertension, blood urea levels and the presence of stasis findings at presentation examination as well as fasting blood suger level may serve as significant predictors of mortality.

KEYWORDS

fasting blood glucose, acute coronary syndrome, mortality

INTRODUCTION

Diabetes Mellitus (DM) is a chronic and progressive disease characterized by hyperglicemia associated with absolute or relative deficiency of insulin or insulin resistance and which courses with impairment in carbohydrade, protein and lipid metabolisms. During its course, microvascular, macrovascular and neuropatic complications may develop. DM has a heterogenous etiology with its genetic and clinical factors and can be called a syndrome. Diabetes is one of the independent risk factors for the development of cardiovascular diseases (1). It is considered as of equal weight with coronary artery disease in terms of cardiovascular risk (2). Coronary artery disease is leading cause of mortality in patients with diabetes and its rate is 2-4 fold higher among patients with diabetes than those without it. The prevalence of coronary artery disease is 55% in diabetes patients, while it's between 2-4% in general population. Therefore, diabetes has been defined as a cardiovascular disease in 1999 scientific report of American Heart Association (3). In those with type 2 Diabetes Mellitus and impaired glucose tolerance, many cardiovascular risk factors including hypertension, obesity, hyperinsulinemia, serum lipid and lipoprotein abnormalities are concomitant (4,5). The presence of more than one risk factor increases risk exponentially. Coronary disease, which occurs frequently in diabetes, passes through an occult stage that can not be detected by routine laboratory methods, much before it comes to the stage of infarction. If glucose levels can be kept within normal range at this early stage, passage to stages after atherosclerosis may be delayed or prevented. Coronary artery disease, which occurs in diabetic patients, arises at earlier ages than that in non diabetics and also has a more unfavorable prognosis with unrecognized angina pectoris, silent myocardial ischemia and silent acute myocardial infections as the causes of sudden and early deaths. Therefore, the earlier we detect this complication, which can cause great danger for diabetic patients, the safer and better the prognosis of the patients become (6). The aim of the present study was to investigate the effect of fasting blood glucose levels in diabetic and non diabetic patients admitted to coronary ICU with the diagnosis of acute coronary syndrome on mortality in hospitalization period.

METHODS

Patients between the ages of 18-65 and over 65, who were admitted to coronary ICU of Haseki Training and Investigation Hospital, with the diagnosis of coronary syndrome were included in the present study. Files of the patiens were reviewed retrospectively. Patients who were admitted with the diagnosis of acute coronary syndrome but whose blood glucose level was not recorded or whose records were missing or could not be reached were excluded from the study. Accordingly, past medical and family history, fasting blood glucose levels and other laboratory investigation results and hospital monitorization data were obtained. All obtained data were recorded on the tables prepared for the study. In statistical evaluation; SPSS (Statistical Package for Social Sciences for Windows) 16.0 program was used. Numerical data were expressed with mean and standard deviation and categorical data with frequency and percentage. Whether the values were distributed homogenously in each group was evaluated with Kolmogorov-Smirnov Z test. In normally distributed numerical values, Studnet's t test was used for paired comparions. If the distribution was not normal, Mann-Whitney U test was employed. In the evaluation of categorical variables, Chi square test was employed. p value of <0.05 or 95% confidence interval was considered statistically significant.

RESULTS

Of 280 patients included in the study, 100 (%35.7) was female and 180 (%64.3) was male. Mean age was 61.62±13.04. Of the patients admitted with the diagnosis of ACS, %17.8 had USAP, %33.6 had ST Elevated Myocard Infarction and %48,6 had non ST Elevated Myocard Infarction. 6 of 100 female patients and 8 of 180 male patients died during hospitalization period. Inhospital mortality rate was found to be 5%. 15.7% of patients underwent thrombolytic treatment. In this group, no inhospital mortality occurred. While DM was present in 31.1% of cases with ACS, 68.9% was not diabetic. 51.1% of the patients was hypertensive. Mean age was found to be significantly higher in cases who died within hospital than the other ones. (p<0.001). Similarly, in cases with hypertension, inhospila mortality rate was found to be significantly higher (p =0.035). No

statistically significant relation was found between inhospital mortality and gender of patients (p=0.567). The presence of stasis findings at presentation was a factor which significantly increases inhospital mortality (p<0.001). Among laboratory findings, no significant relation was found between HgbA1c, triglyceride, HDL cholesterol, ALT and AST levels and mortality. Total cholesterol and LDL cholesterol levels were found to be significantly lower in the group with mortality (p=0.002, p=0.021). Significant relation was found between mortality and high urea, creatinin values and low potassium values (p<0.001, p=0.003, p=0.041). A significant relation was found between the first fasting blood glucose level after admission and in hospital mortality, (Table-1).

Table 1: General characteristics of study patients.

	No mortality (n:266)	Mortality (n:14)	P value
Gender K/E	94/172	6/8	0.567
Age	61.62 ±13.04	78.00±7.50	<0.001
Fasting blood glucose (mg/dl)	118.12± 50.501	158± 63.994	0.004
Hypertension (n) (N) Yok / Var	134/132	3/11	0.035
Total cholesterol (mg/dl)	184.36± 43.862	141.36± 35.331	0.002
Trigliceride (mg/dl)	170.89± 117.278	112.73± 49.824	0.103
HDL-cholesterol (mg/dl)	34.89± 13.225	31.09± 12.186	0.351
LDL-cholesterol (mg/dl)	117.23± 37.328	90.82± 27.946	0.021
AST (U/L)	49.48± 78.542	83.93± 74.599	0.121
ALT (U/L)	42.42± 111.654	23.40± 23.306	0.592
Urea (mg/dl)	42.60± 23.780	87.64± 65.815	<0.001
Creatinine (mg/dl)	1.0614± 0.60849	1.5929± 1.06732	0.003

(AST: Aspartate aminotransferase, ALT: Alanine aminotransferase)

DISCUSSION

It is known that diabetes mellitus is major risk factor for cardiovascular disease. In the present study, of the patients with ACS, %64.3 were male and %35.7 were female. That males are the majority among patients admitted with ACS, has been established by many studies in various countries. In the present study, the rate of inhospital mortality was found to be 5%. At present, developments in antithrombotic, fibrinolytic, beta blocker, ACE inhibitor treatments and in acute period percutanesous transluminal coronary angioplasty and coronary artery by-pass operations have reduced inhospital mortality of AMI to 5-7%, which has been demonstrated by many recent multi center randomized studies (7). In the evaluation of mortality results in this present study, it should be kept in mind that suitable patints were referred to a tertiary center for invasive interventions.

Mean age of the cases was 61.62 ± 13.04. In the Thrombolysis in Myocardial Infarction (TIMI) study risk scoring, age 65 has been reported to have high risk for ACS. In the present study, mean age of the cases with inhospital mortality was found to be significantly higher than that of other cases. As stated in JNC 7 report, advanced age is a cardiovascular risk factor (8). It has been determined by various studies that the rate of mortality is higher in elderly patients with ACS and that advanced age is a predictor of negative outcome for post ACS period (9,10).

In the present study, total cholesterol and LDL cholesterol levels were found to be significantly lower in the groups with mortality. However, lipid values measured during AMI may be misleading, as some factors may change lipid values in patients admitted to hospital. For example, while stress increases serum cholesterol, supine position decreases it. Serum triglycerides are influenced by calorie intake, intravenous glucose and lying in supine position. Within 24-48 hours of hospitalization, total cholesterol and HDL cholesterol levels are found to be comparable to those at baseline, but subsequently they decrease rapidly. The decrease in HDL cholesterol after AMI is higher than that in total choleterol, thus the ratio of total cholesterol/HDL cholesterol is not used in risk prediction after AMI. Serum lipid level measurments yield more accurate results after the 8th week post-infarction. In the present study, the rate of inhospital mortality was found to be significantly higher in patients with hypertension than that in those

without hypertension. 12 year follow up data of TEKHARF study have revealed that hypertension is the most important factor predicting coronary origin deaths in adult population. In the present study, a strong and statistically significant relation was found between high blood urea and creatinin values and inhospital mortality (respectively p<0.001, p=0.003). In some studies, it has been stated that impaired renal function is a strong independent predictor of long term mortality in acute coronary syndrome patients (11,12). In the present study, in which the effect of fasting blood glucose level on inhospital mortality was investigated, a significant positive corrrelation was found between fasting blood glucose level and inhospital mortality (p=0.004).

When the patients were divided into two groups, i.e. patients with FBG level under 100 and those whose levels were at or over 100, inhospital mortality was found to be significantly increased in the latter group (p=0.020). In a study with 13526 patients in acute coronary syndrome spectrum, evaluating the relation between fasting blood glucose levels and short term and 6 months mortality, it was established that mortality is increased significantly with rising fasting blood glucose levels (13). In DECODE study, it has been established that impaired fasting hyperglicemia is not an independent risk factor for CVD after the matching of known risk factors for CVD, while 2nd hour postprandial hyperglicemia is an independent risk factor. It has also been determined that especially in people with impaired glucose tolerance (IGT), risk of mortality is much higher than that in those with impaired fasting glucose or normoglicemia (14). In FUNAGATA study, it has been stated that impaired glucose tolerance is a risk factor for cardiovascular disease whilst impaired fasting glucoses is not so (15). In Baltimore Longitudinal Study on Aging study, 937 nondiabetic inividuals have been followed for 9.5 years. In prediabetic groups consisting of individuals with IGT or IFG+IGT, atherogenic risk factors have been found to be higher than those in individuals with normal glucose tolerance. There was a marked rise in overall mortality with the increase in fasting blood glucose from 110 mg/dl to 120 mg/dl (16).

In the study of Kolman et al, it was established that inhospital mortality was significantly higher in patients whose blood glucose level was between 120-126 and over 126 than those with blood glucose level under 100. Similarly, major cardiac adverse effects were also found to be significantly higher in the groups with blood glucose level over 100. In subgroups analysis, major adverse effects were found to be at a higher rate in patients with high blood glucose level and no previous known DM diagnosis than those with high blood gluoce level and known DM (17). In a metaanalysis of 15 studies, it was found that in both diabetic and non-diabetic patients, there was a positive relation between fasting glucose levels and inhospital mortality (18).

CONCLUSION

In patients followed in coronary intensive care units with the diagnosis of acute coronary syndrome, in patients with high fasting blood glucose level and those whose blood glucose level is at or over 100, short term mortality risk increased compared to those with normal fasting blood glucose levels.

The development of microvascular and microvascular complications of diabetes start 1-12 years before the diagnosis of the disease. Atherosclerotic heart disease is a preventable one. When the factors leading to disease are detected beforehand and modifiable risk factors are eliminated, primary prevention can be achieved. Diabetes and its treatment is prominent among modifiable risk factors. Diabetes, which has become epidemic at present, is an important disease in that it gives rise to complications increasing morbidity and mortality when uncontrolled and hence creates an important economic burden both for the individuals and the community. Preventing its increase will become possible through increasing the awareness of diabetes throughout community, healthy and correct nutrition style and regular exercise.

In patients with acute coronary syndrome, evaluation of fasting blood glucose level, age, hypertension, blood urea, creatinin and lipid levels in combination with stasis findings at presentation may be a significant predictor of mortality.

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