PROGNOSTIC VALUE OF BLOOD GLUCOSE LEVELS IN DIABETIC PATIENTS UPON ADMISSION AND ITS OUTCOMES IN PATIENTS WITH ACUTE CORONARY SYNDROME

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ABSTRACT

Background: Coronary heart disease (CHD) is the primary leading cause of morbidity and mortality in patients with diabetes mellitus. Hyperglycemia on admission was associated with a worse outcome for all patients admitted with ACS. **Aim:** To correlate the relationship between hyperglycemia with acute coronary syndrome and poor outcome. **Methodology:** Clinical evaluation of the patients were carried out on arrival to Emergency Department regarding the Initial assessment of general patient condition either stable or not through; ABCDE (airway and cervical spine control, breathing, circulation, neurological dysfunction and exposure). Then determine the characters and types of chest pain. Assess the condition of the patients either stable or unstable which will determine the needed investigations and plan of management. **Results:** The mortality was higher in patients with RBG more than 300 mg/dl (68.4%), (10.5%) of the patients had ranged from 250 - < 300 mg/dl, and the patients had ranged from 200 - < 250 mg/dl were (10.5%). The patients had ranged from 160 - < 200 mg/dl were (5.3) and there were (5.3) of the patients had ranged from 70 - < 160mg/dl. **Conclusion:** The data from this study have shown that hyperglycemia on admission was associated with a worse outcome for all patients admitted with ACS.

KEYWORDS: Diabetes mellitus; Acute coronary syndromes; Blood Supply of the Heart; CK-MB

Introduction

Acute coronary syndrome (ACS) is a group of symptoms attributed to obstruction of the coronary arteries. The most common presentation of ACS is chest pain, often radiating to the left arm or angle of the jaw, compressive in character, and associated with nausea, vomiting and sweating. [1]

The acute coronary syndrome usually occurs as a result of ST elevation myocardial infarction STMI, non-ST elevation myocardial infarction NSTMI, or unstable angina UA. [2]

Diabetic patients have an increased prevalence of atherosclerosis and coronary artery disease (CAD) and experience higher morbidity and mortality after acute coronary syndrome and myocardial infarction (MI). [3]

Beta blockers are essential drugs for antihypertensive regimens in patients who have diabetes, CAD, and stable angina. [4]

A retrospective analysis of data from diabetic patients with ST-segment elevation myocardial infarction (STEMI) treated with reteplase or the combination of reteplase and abciximab

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showed that although combination therapy significantly reduced the incidence of reinfarction, recurrent ischemia, and urgent revascularization in diabetic patients continued to have a worse outcome from MI than nondiabetic patients. [5]

Patients with diabetes have increased levels of plasminogen activator inhibitor type 1 (PAI-1) in plasma and atheromas. Elevated tissue PAI-1 could decrease fibrinolysis, increase thrombus formation, and accelerate plaque formation. [6] Other vascular changes, including increased endothelin activity and reduced prostacyclin and nitric oxide activity, lead to abnormal control of blood flow. [7]

Diabetes also increases the risk of heart failure. Patients with diabetes are 2:5 times more likely to develop heart failure than that none diabetic, [8] and, following the development of heart failure, diabetic patients have higher mortality and heart failure-related morbidity. [9]

Other diabetes changes that occur include diabetic cardiomyopathy, which impairs myocardial performance and the myocardium more susceptible to and less able to recover from ischemia, and diabetic autonomic neuropathy, which results in sympathovagal imbalance and increase cardiovascular mortality. Advanced glycation end products (AGEs), may contribute to many of these diabetes-specific changes. [10] Coronary artery disease (CAD) is the leading associated cause of morbidity and mortality in diabetic patients.[11]

Hyperglycemia in acute coronary syndrome may be enhanced local thrombin generation and platelet activation, in compared without a previous history of diabetes.[11]

Methods

Study population:

Diabetic patients with acute coronary syndrome admitted to Emergency Department at Suez Canal University Hospital. The sample population was drawn randomly from the diabetic patient admitted to Suez Canal University Hospital with acute coronary syndrome fulfillment inclusion criteria.

Inclusion criteria:

1. Patients with acute coronary syndrome with history of diabetes.
2. Age group: (18 – 70) years.

Exclusion Criteria:

1. History of chronic disease as end stage respiratory disease (ESRD), heart failure
2. History of malignancy.

Data Collection and Statistical Analysis:

Data collected throughout history, clinical examination and laboratory results will be coded, entered and analyzed using Microsoft Excel software. Data will then import into SPSS (Statistical Package for Social Sciences) software program version 10.0 for analysis. According to the type of data, the following tests will be used to test differences for significance; Chi-square, t-test, multi-variant regression analysis and one-way ANOVA with least significance difference. P value will be set at <0.05 for significant results. T-test will be used to compare between diabetic patients with acute coronary syndrome and death and diabetic patients with acute coronary syndrome and survival.

Results

Table (1) shows the age distribution associated with mortality in patients with acute coronary syndrome: the mortality was higher in patients more than 60 years old (52.6%), (42.1%) of the patients had age ranged from 51 60 years old and (5.3%) of the patients had age ranged from 41 50 years old.

Table 1 Comparison between mortality and survival cases regarding age (n=62).

Age	Death (n = 19)		Survived (n = 43)		
	No	%	No	%	P value
30-40	0	0	1	2.3	0.561
41-50	1	5.3	7	16.3	0.561
51-60	8	42.1	14	32.6	0.561
61-70	10	52.6	21	48.8	0.561
Mean ± SD	58.47 ± 6.75		56.33 ± 7.88		0.306

Table (2) shows the type of diabetes distribution associated with mortality in acute coronary syndrome patients: the mortality was higher in patients with IDDM (78.9%), and (21.1 %) of the patients were on oral hypoglycemic.

Table 2 Comparison between mortality and survival cases regarding type of Diabetes (n=62):

Type of Diabetes	Death		Survived		P value
	(n = 19)		(n = 43)		
	No	%	No	%	
Type I DM	15	78.9	27	62.8	0.056
Type 2 DM	4	21.1	16	37.2	0.056

Table (3) shows the RBG distribution associated with mortality in patients with acute coronary syndrome: the mortality was higher in patients with RBG more than 300 mg/dl (68.4 %), (10.5 %) of the patients had ranged from 250 - < 300 mg/dl, and the patients had ranged from 200 < 250 mg/dl were (10.5 %). The patients had ranged from 160 - < 200 mg/dl were (5.3), and there were (5.3) of the patients had ranged from 70 - < 160mg/dl.

Shows the RBG distribution associated with mortality in patients with acute coronary syndrome: the mortality was higher in patients with RBG more than 300 mg/dl (68.4 %), (10.5 %) of the patients had ranged from 250 - < 300 mg/dl, and the patients had ranged from 200 < 250 mg/dl were (10.5 %). The patients had ranged from 160 - < 200 mg/dl were (5.3), and there were (5.3) of the patients had ranged from 70 - < 160mg/dl.

Table (4) shows the heart disease distribution associated with mortality in patients with acute coronary syndrome: anterior MI is the primary cause of mortality (57.9 %), inferior MI causes (21.1%) of mortality, infarction in RV causes (15.8 %) of mortality and unstable angina causes (5.3) of mortality.

Table 3 Comparison between mortality and survival cases regarding RBG (n=62):

RBG	Survived		Death		P value
	n =	Percentage	n =	Percentage	
	43	%	19	%	
70 - <160	11	25.6	1	5.3	<0.001*
160 - <200	7	16.3	1	5.3	<0.001*
200 - <250	11	25.6	2	10.5	<0.001*
250 - <300	9	20.9	2	10.5	<0.001*
≥ 300	5	11.6	13	68.4	<0.001*
Mean ± SD	215.21 ± 77.99		436.21 ± 110.80		<0.001*

Table 4) Comparison between mortality and survival cases regarding ACS (n=62): *Significant P < 0.05

ACS	Death		Survived		P Value
	(n = 19)		(n = 43)		
	No	%	No	%	
Inferior MI	4	21.1	20	46.5	0.040*
Infarction in RV	3	15.8	0	0	0.040*
Anterior MI	11	57.9	19	44.2	0.040*
Unstable angina	1	5.3	3	7	0.040*
Antroseptal MI	0	0	1	2.3	0.040*

Discussion

This study comprised 62 patients with acute coronary syndrome and known to be diabetics. They were predominantly males (51.6%), and female (48.4%), and the age ranged from 18 to 70 years.

The results of this study showed that diabetic patients presenting with hyperglycemia and ACS, who are a high-risk population. Abnormal glucose metabolism during the acute phase of ACS is typical, and admission hyperglycemia is associated with increased short-term mortality in diabetic patients.[12]

Our study has shown that: hyperglycemia on admission is a strong precipitated factor for poor outcome in all patients admitted with ACS. There is highly statically significant difference "<0.001" when compared to death in normoglycemic and hyperglycemic group.

This was in agreement with Chi Yuen et al. "2011" who found that: elevated blood glucose level on admission is a prognostic factor for short-term and long-term mortality in acute coronary syndromes (ACS) in both nondiabetic and diabetic patients.[13] Our study has shown that anterior infarction on admission is a strong precipitated factor for poor outcome in all patients admitted with AMI more than other types of infarction. There is highly statically significant difference "<0.040" when compared to death in different types of infarction.

This was in agreement with Stone et al. "2011" which found that: Patients with anterior infarction had a substantially worse in-hospital and follow-up clinical progress course compared with those with inferior infarction. [14]

Our study has shown that: the high level of CKMP on admission is a strong risk factor for worse outcome in all patients admitted with ACS. There is highly statically significant different "<0.042" when we compare between death in various levels of CK-MB.

This was in agreement with Galla et al. "2013": who found that: CK-MB remains a reliable marker for myocardial necrosis and a strong predictor of bad prognosis. All patients with ACS should have CK-MB level to search for cardiac ischemia. Patients with elevated CK-MB should receive aggressive management. With their increased risks mortality [15].

Conclusion

Hyperglycemia in ACS patients on admission considered a significant predictor of in-hospital mortality after adjustment for multiple risk factors known to be associated with increased in-hospital mortality.

According to our results, hyperglycemia on admission clearly predicts an adverse outcome and could, therefore, be used as an early marker of high-risk individuals.

These patients may benefit from an appropriate treatment strategy, including strict glycemic control. The high level of CKMP on admission is a strong risk factor for worse outcome in all patients admitted with ACS.

Anterior MI is considered as a major predictor of death in patients with acute myocardial infarction.

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