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HBA1C AS A RISK PREDICTOR OF ACUTE CORONARY SYNDROME

General Medicine

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ABSTRACT

Introduction/ Background: Diabetes mellitus (DM) has emerged as a modern epidemic and is at raising trend globally and will continue to be in the future. Cardiovascular complications are a major cause of death in patients with type II DM. This study was undertaken to find the relationship between HbA1c levels with mortality, morbidity,and severity in patients with Acute Coronary Syndrome(ACS).

Objective: To find the relationship between HbA1c levels with mortality, morbidity,and severity in patients with ACS.

Material and Method: Prospective observational study was undertaken in Rohilkhand Medical College and Hospital, Bareilly including 100 patients in the medical wards from 1st Jan 2018 to 31st dec 2018. Detailed clinical examination, routine investigations including HbA1c were done. The data was computed and was statistically analyzed.

Results: Out of 100 patients, 58 were non-diabetic, 27 were diabetic and 15 had impaired glucose tolerance. 50 patients had dyslipidemia, of which 70% of patients with diabetes had dyslipidemia whereas 50% of impaired glucose tolerance and 41% of non-diabetic patients had dyslipidemia. Dyslipidemia was common in diabetic patients as compared to non-diabetics. 27 patients out of 100 patients had complications of which 12 were non-diabetics, 11 were diabetics while4 had impaired glucose tolerance. The patients with complication had higher mean HbA1c level. (7.14 ± 1.88 in patients with complications as compared 5.56 ± 1.30 in patients without complications) In Coronary Artery Angiography(CAG), multivessel disease involvement was significantly more in diabetics as compared to nondiabetic.(the mean HbA1c was found to be significantly more in patients with the multivessel disease compared to those without multivessel disease).

Conclusion: ACS can be the initial presentation of DM i.e patients of DM can have macrovascular complications of diabetes without having the usual symptoms of DM. HbA1c may be a useful indicator for Coronary Artery Disease(CAD) risk evaluation. HbA1c should be used as a measure to label a patient as diabetic in patients of ACS over blood sugar levels. Patients with DM, when compared to non-diabetics, have increased morbidity and severity after an ACS.

KEYWORDS

INTRODUCTION

Approximately 194 million cases of type 2 diabetes are prevalent worldwide and this number is expected to increase upto 333 million by 2025. In India, there are approximately 33 million diabetics in India and the number expected to reach 79.4 million by 2030.[1]

The term acute coronary syndrome (ACS) refers to any group of clinical symptoms compatible with myocardial ischemia and covers the spectrum of clinical conditions ranging from unstable angina, non-ST-segment elevation myocardial infarction (NSTEMI) and ST-segment elevation MI (STEMI).[2] Smoking, diabetes, hypertension, dyslipidemia, obesity, psychosocial factors, lack of exercise and a diet low in fruit and vegetables along with little or no alcohol consumption are potentially modifiable risk factors for ACS; Diabetes mellitus (DM) being one of the major major risk factors.

HbA1c is a biomarker reflecting both fasting and postprandial plasma glucose concentration over the preceding 3 months and also it has been regarded as an important tool in the management of diabetes.[4] HbA1c can be used to diagnose diabetes and the diagnosis can be made if HbA1c level is >6.5%.[5]

Compared to non-diabetics, persons having diabetes have a two to four-foldincreased risk of development of and death from Coronary Artery Disease(CAD).[6] Diabetic subjects have been reported to develop congestive heart failure in the setting of ACS.[7] Some data demonstrated a significant positive correlation between HbA1c and coronary angiographic scores, indicating it as a marker of extensive coronary artery disease.[8]

Thus, we took this study at ROHILKHAND MEDICAL COLLEGE AND HOSPITAL (RMCH), Bareilly to find the relationship between HbA1c levels with mortality, morbidity,and severity in patients with ACS.

MATERIALAND METHOD

In this cross-sectional observational study, 100 patients who visited RMCH between 1st Jan 2018 to 31st Dec 2018 were included.

Inclusion criteria

All patients with acute coronary syndrome presenting within 24 hours.

Exclusion criteria

All patients with acute coronary syndrome with

- Past history of Diabetes Mellitus
- Coronary Artery Disease
- Other co-morbidities like sepsis, hemoglobinopathy or chronic kidney disease

Detailed history and clinical examination were performed and laboratory investigations were done after explaining the nature of the study and informed written consent taken from the patients. The following investigations were done:

- Blood glucose: FBS, PPBS
- Renal function tests
- Electrolytes
- Glycosylated hemoglobin (HbA1c)
- Fasting Lipid profile
- Urine routine and microscopy
- Electrocardiography(ECG)
- Fundoscopy
- Chest x-ray
- Echocardiography (E/A ratio; left atrial size was assessed)
- Cardiac enzymes like CPK-MB
- Coronary angiography (CAG)

RESULT

Out of 100 subjects, 76 were males and 24 females. The mean age was 57.78±8.89 years. Out of 100 patients, 58 were non-diabetic, 27 were diabetic and 15 had impaired glucose tolerance. 46 patients had hypertension. 50% of patients had dyslipidemia, of which 70% of patients with diabetes had dyslipidemia whereas 50% of prediabetic and 41% of nondiabetic patients had dyslipidemia. Dyslipidemia was common in diabetic patients as compared to non-diabetics.

27 patients out of 100 patients had complications like (Left Ventricular Dysfunction, Shock, Heart Failure, Arrhythmia). In these 27, 12 were

non-diabetics, 11 were diabetics while 4 had impaired glucose tolerance (Table-1). Left ventricular dysfunction and heart failure (HF) were the most common complication and thiswas significantly more common in diabetics as compared to non-diabetics. LVD (EF <40%) was present in 9 out of 27 diabetic patients whereas HF was seen in 8 patients.

The patients with complication had higher mean HbA1c level . (7.14 ±1.88 in patients with complications as compared 5.56 ± 1.30 in patients without complications, Table-2) and this was found statistically significant.

Table-1: Correlation of HbA1c with Complications

Category	All Complications		Total
	Present	Absent	
Diabetic	11(40.70%)	16 (59.30%)	27
Impaired glucose tolerance	4 (26.66%)	11(73.33%)	15
Non Diabetic	12 (20.68%)	46 (79.31%)	58
Total	27	73	100 (p=0.0064)

Table-2:Correlation of mean HbA1c with Complications

All complications	Mean HbA1C	Std. Deviation	No of Patients
Present	7.14	1.88	27
Absent	5.56	1.30	73 (P=<0.0001)

The severity of CAD was assessed in 58 patients who underwent CAG. Multivessel disease involvement was significantly more in diabetics as compared to nondiabetic. The diabetic patient had multivessel disease observed in CAG which was significantly higher as compared to a nondiabetic. Moreover, the mean HbA1c was found to be significantly more in patients with the multivessel disease compared to those without the multivessel disease. It was found that most of the patients with the single-vessel disease had their HbA1c between 6.5% to 8.5% and most patients with the multi-vessel disease had their HbA1c level above 8.5%.

DISCUSSION :

Despite major advances in medical sciences, the outcome of the acute coronary syndrome (ACS) has a significant impact on the morbidity and mortality of patients with acute myocardial infarctions (AMI) and diabetes mellitus being a major risk factor for ACS.

The presence of DM doubled the age-adjusted risk for cardiovascular disease in men and tripled in women in the Framingham Heart Study and it is an independent risk factor even after adjusting for age, hypertension, smoking, dyslipidemia and left ventricular hypertrophy.[9] For every one-percentage-point increase in glycosylated hemoglobin (HbA1c), the relative risk for any cardiovascular event was 1.18 (95% CI 1.10–1.26) was concluded in a meta-analysis of 13 prospective cohort studies.[10] Moreover, diabetic patients when compared to those without diabetes, after an acute coronary syndrome have worse long-term outcomes.[11,12]

27 patients in our study with no history of DM had HbA1c more than 6.4% i.e. they were found to be diabetic implies that these patients presented with acute coronary syndrome directly to the hospital. And 15 patients had HbA1c in the impaired glucose tolerance range (5.7 to 6.4%). Thus, we can conclude that patients of DM can have macrovascular complications of diabetes without having the usual symptoms of DM and can directly present with them. This might be partly because the majority of patients of type 2 DM are asymptomatic and can directly present with chronic complications,unlike type 1DM. The classic symptoms of hyperglycemia like polyuria, polydipsia, polyphagia, nocturia, weight loss are often noted only in retrospect when hyperglycemia is noted on laboratory evaluation done either routinely or due to some complication.

In this study, we used HbA1c levels to diagnose the diabetic patient, impaired glucose tolerance and non-diabetics (as per the American Diabetes Association criteria of HbA1c <5.7% normal; 5.7% to 6.4% impaired glucose tolerance; ≥6.5% diabetes). Because increased blood sugar levels performed during the hospitalization in patients could be either previously unrecognized diabetes or that the stress of MI unmasks or worsens the tendency toward hyperglycemia.

A positive correlation between HbA1c levels and complications was found in our study. Complications were present in 27 patients, the most common being LVD. Compared to non-diabetic patients LVD and HF were more common in diabetics. Diabetic patients have higher LV mass, wall thickness, and arterial stiffness, reducedresting LV ejection fraction (LVEF) and diminished systolic function and reduced cardiac reserve as compared to individuals without diabetes.

Coronary angiography was performed on all patients. The relationship between HbA1c and number of vessels involved was evaluated and it was found that most of the patients with the single-vessel disease had their HbA1c between 6.5%-8.5% and most patients with the multi-vessel disease had their HbA1c level above 8.5%. At the end of the study, it was concluded that HbA1c may be a useful indicator for CAD risk evaluation

CONCLUSION

ACS can be the initial presentation of DM i.e. patients of DM can have macrovascular complications of diabetes without having the usual symptoms of DM. HbA1c may be a useful indicator of CAD risk evaluation. HbA1c should be used as a measure to label a patient as diabetic in patients of ACS over blood sugar levels. Patients with DM, when compared to non-diabetics, have increased morbidity and severity after an ACS.

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