Original Article

Stress Hyperglycaemia During Acute Coronary Syndrome of Non-Diabetic Patients

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Abstract

The risk of diabetes mellitus and coronary heart disease is high among South-Asian population. In this study, our objective was to measure blood glucose level during acute coronary syndrome of previously known non-diabetic patients that will give the information about the frequency of acute hyperglycemia in acute coronary syndrome (ACS) among Bangladeshi population. It is an observational cross sectional study performed in Rajshahi Medical College Hospital. A total of 248 non-diabetic subjects with ACS got admitted into hospital. FBS and standard OGTT within 3 days of ACS were done. This study was done to find out glucose abnormalities among ACS patients. Out of 248 study population, 135(54.44%) had glucose abnormalities. Male was 87.10% (216). Among male, IGT (prediabetic) was 31.94% (69) and diabetic 24.54% (53). Mean age (±SD) of our study population was 51.71±11.84 years. Normal glucose tolerance (NGT) was found in 45.6% (113) cases, IGT (prediabetic) and diabetic were detected among 30.6% (76) and 23.8% (59) cases respectively. Non-diabetic Bangladeshi patients showed a high prevalence of hyperglycemia in acute coronary syndrome (ACS). We should create awareness about a new risk factor- acute hyperglycemia during acute coronary syndrome and take appropriate and effective measures to reduce morbidity as well as mortality as a consequence of acute hyperglycemia during ACS with or without diabetes.

Key words: Acute coronary syndrome, IGT, IFG, HbA$_1$C.

Introduction

Acute coronary syndrome (ACS) is an emergency situation requiring immediate diagnosis and treatment. Unstable Angina Non ST Elevation Myocardial infarction, and ST Elevation Myocardial infarction collectively constitute the diagnosis of Acute Coronary Syndrome.[1] Cardiovascular disease (CVD) are the leading cause of death worldwide. WHO predicted that coronary heart disease will be the top of the contributors to disease burden by 2020 and world will face an impending epidemic of the disease. The prevalence of coronary heart disease was estimated as 3.3/1000 in 1976 and 17.2/1000 in 1986 indicating 5 folds increase disease in 10 years. The incidence is similar in other developed countries and is rising at an alarming rate in developing part of the world. The management of patients with Acute Coronary Syndrome is one of the major challenges presently in the field of Cardiology[1],[2]. High admission blood glucose levels after myocardial infarction are common and

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are associated with and increased risk of death in subjects with and without diabetes. In this review, the possible toxic action of acute hyperglycemia is discussed in order to explain the worse prognosis in subjects with myocardial infarction and concomitant hyperglycemia.[3] In recent years, much attention has been given to the evidence that the concomitant occurrence of hyperglycemia in patients admitted to intensive care units with an acute myocardial infarction enhances risk of mortality and morbidity, whether the patients has diabetes or not[4]. However, a positive association between hyperglycemia at the time of the event and subsequent mortality from has frequently been reported [5-16]. This may mean that besides being causal, elevated glucose also could be a marker of existing insulin resistance and or beta cell failure that may contribute to the poor prognosis through other mechanisms.

Objective

To estimate blood glucose level during acute coronary syndrome of non-diabetic patients.

Research Design and Methods

This is an observational cross-sectional study & was carried out in Coronary Care Unit (C.C.U), Rajshahi Medical College and laboratorical tests were carried out in Diabetic Clinic, Rajshahi. Sample size was 380. Patients admitted to coronary care unit in Rajshahi Medical College with ACS and with no known history of diabetes were recruited for the study. Criteria for the diagnosis of acute myocardial infarction. (a) Typical chest pain. (b)ECG change. (c) Cardiac enzymes elevation. Any two of above three criteria is considered as acute myocardial infarction. Patients with thyroid diseases, renal failure, heart failure, severely debilated condition and previous known history of diabetes were excluded. FBS and standard OGTT within 3 days were done after clinically and hemo dynamically stable from acute illness of ACS patients. Usually on the 2nd or 3rd day, fasting blood sample was drawn for estimation of plasma glucose and HbA1c. All of the remaining subjects underwent glucose tolerance test with 75Gm glucose load on the 3rd day after admission. Blood sample collection was done under aseptic precaution with the consent of patients. All samples were sent to laboratory.

Results

Among 256 patients, eight patients (8) were found to have high levels of HbA1c. After their exclusion, sample size had become 248 patients. Among 248 patients, the mean age was 51.71± 11.84 with a range of 23-85 yrs. Among them male was 216 (87%) and female was 32 (12.9%).It is observed that 34.27% (85) of the sample population was of from 41-50 years age group. About the occupation of sample population, 37.50% (93) were businessman. The proportion of married couple was 231(93.1%). Only 12.90% (32) and 01.21% (03) of the respondents were over-weight and obese respectively. Acute MI was 89.52% (222) and rest of the patients had unstable angina. Among them, Anterior and inferior MI occupied the major proportion of the ACS (34.27% both). It is interesting to find that among the 248 patients, 32(12.9%) was diagnosed as diabetic by fasting blood sugar estimation and 195(78.6%) was normal. On the other hand by OGTT examination, 59(23.8%) were diagnosed as diabetic and only 45.6% (113) were normal. (Table –1)

Diabetes mellitus was more commonly noticed in anterior MI (28.24%) and antero-septal MI patients (27.66%). IGT occupied 36.47% in inferior MI patients. Patients suffering from Sub-endocardial MI mostly (80.00%) had normal blood glucose level (Table-2). The Characteristics of total study group and the sub groups in relation to the glucose tolerance status reveals that age, BMI and blood pressure parameters were not significantly different among the sub-groups. Plasma glucose values were significantly higher in the newly diagnosed diabetic subjects On the other hand, mean age was 51.88±12.89 where had high blood glucose level. (Table-3).

Table-I: Glycemic status of the sampled population.

Glycemic status		
FBS		
	No.	%
Normal (> 6.1 mmol/l)	195	78.6
IFG (6.1-6.9 mmol / l)	21	8.5
Diabetic (>6.9 mmol / l)	32	12.9
Total	248	100.00
OGTT.		
Normal (<7.8 m mol / l)	113	45.6
IGT (7.9-11.1mmol /l)	76	30.6
Diabetic (> 11.1 mmol / l)	59	23.8
Total	248	100.00

Table-2: Glycaemic conditions in the patients of ACS.

Glycaemic status during ACS.								
	Normal.		IGT.		Diabetic.		Total.	
	no	**no**	**no**	**no**	**no**	**no**	**no**	**%**
Anterior MI.	35	41.18	26	30.59	24	28.24	85	100.00
Antero-septal MI.	23	48.94	11	23.40	13	27.66	47	100.00
Inferior MI.	37	43.53	31	36.47	17	20.00	85	100.00
Sub-endocardial MI.	04	80.00	00	00	01	20.00	05	100.00
Unstable angina	14	53.85	08	30.77	04	15.38	26	100.00
Total	113	45.56	76	30.65	59	23.79	248	100.00

Table-3. Characteristics of total study group and the sub groups in relation to the glucose tolerance status:

Parameters	Total	Normal	IGT	Undiagnosed diabetes
Number	248	113	76	59
Age (years)	51.71±11.84	52.46±11.89	50.47±10.94	51.88±12.89
BMI.	22.55±2.71	21.93±2.57	23.03±2.69	23.12±2.82
Plasma glucose (mmol/l)				
Fasting	5.95±1.49	5.49±0.82	5.85±1.03	6.95±2.31
2 h (OGTT)	9.40±3.38	6.71±0.91	9.51±0.95	14.39±2.56
HbA1c	5.74±0.58	5.56±0.48	5.71±0.62	6.14±0.49
Blood pressure (mmHg)				
Systolic	131.57±10.27	130.44±7.21	131.44±12.85	133.89±11.26
Diastolic	77.28±9.62	76.46±9.27	77.30±9.47	78.81±10.39

Discussion

This study was conducted regarding evaluation of frequency acute glucometabolic abnormalities during ACS patients among Bangladeshi population. Acute hyperglycemia is a new risk factor during myocardial infarction. In fact the prevalence of previously undiagnosed diabetes and glucose abnormalities was unexpectedly high among patients with acute coronary syndrome.

Norhammar A, et al[7] had shown in their study, mean age was 63.5±9.4 years where as in our study, mean age group was 51.71±11.84 years which is lower than that of above study. Ramachandran A, et al. a study performed in Asian Indian subjects, the mean age group was 55±10.6 years which is nearly similar to our study group.

Wahlberg [8] and Paaskivi[9] stated that prevalence of glucose disturbances in patients with acute coronary syndrome was high. Gerstein [10]HC, et al showed (64%) glucose disturbances in patients with acute coronary syndrome. In our study, glucose disturbances were 54.44%.

Oswald G, Corcoran S, Yudkin J.[11] had shown (approx.) 5%, a previously undetected diabetes mellitus. Our study had shown 3.23% previously undetected diabetes mellitus that is about half of the above. (Table-I)

Ramachandran A, et al.[12] mentioned common age group of diabetics between 50-70years.Relatively older than our age group (41-50 years) of our study. IGT also was more prevalent between (31-40) years. More active and productive group of population is affected by Glucose abnormalities in our study.

Norhammar A. et al showed that IGT was 35% and 31% was diabetics. A study conducted in England and Wales hospital 67 where diabetes

were 9.9% and in French, IGT was 16.40% and diabetes were 16.70%.68 Another study among south-Indian population by Ramachandran A, et al. showed diabetic was 37.7% and IGT was 45.9%. On the other hand, our sample shows, 76 (30.60%) patients were IGT and 59 (23.8%) patients was diabetic. Results of our study nearly similar to above study. (Table-2)

In a study among south-Indian population, Ramachandra and Associates remarked about mean age, blood pressure, BMI and plasma glucose level which were nearly similar to our study. Similarity of results of our study with that of Ramachandra and his colleagues because of geographicaldistribution, lifestyle and dietary habits almost same. (Table-3)

In summary, glucose abnormalities including IGT and diabetics among Bangladeshi population are remarkably high in non-diabetic ACS patients, more predominant in active and productive age groups (41-50 years), smokers and hypertensive patients. Service-holders were more diabetic and businessmen had more IGT. On the other hand, IGT were more prevalent among under-weight ACS patients

Conclusion

Diabetes is common among patients with acute coronary syndromes and morbidity and mortality after such event is high. This thesis deals with risk factors for increased mortality, how to optimize and improve care and prognosis in patients with diabetes mellitus and acute coronary syndrome.

ACS is a medical emergency requiring immediate diagnosis and treatment. It is increasing at an alarming rate in developing part of the world. The management of patients of ACS is one of the major challenges presently in the field of cardiology.

Acute hyperglycemia is a new risk factor during acute MI. It enhances the risk of mortality and morbidity.AMI related complications are also more. The prevalence of diabetes, previously not known diabetes and glucose disturbances preceding diabetes is much higher than previously

considered among patients with acute coronary syndrome. Patients with acute hyperglycemia are possible to detect already during the initial hospitalization for a coronary event. An abnormal test results after an OGTT implies increased risk for both future DM and diabetes specific complication and for future cardiovascular morbidity and mortality [13,14].

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