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Association between Glycemic Gap at Admission and In-Hospital Outcome in Patients with Diabetes with Acute Myocardial Infarction

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ABSTRACT

Background: Acute hyperglycemia predicts adverse outcomes in patients with acute myocardial infarction (AMI), but it has a major disadvantage because the association is diminished in patients with diabetes mellitus (DM). Recent studies introduced a more accurate predictor, the glycemic gap (the difference between admission blood glucose and the estimated average glucose), that could anticipate adverse outcomes in patients with diabetes with AMI.

Aims: This study aimed to determine the association between glycemic gap and clinical outcome in diabetic patients presenting with AMI to a tertiary hospital in Bangladesh.

Methods: Two hundred twenty diabetic patients hospitalized with AMI were included in this study from the Department of Cardiology of Chittagong Medical College Hospital from March 2023 to February 2024. Admission blood glucose and HbA1c were measured, and the glycemic gap was calculated. Patients were prospectively followed during their hospital stay to obtain data regarding major adverse cardiac events (MACEs).

Results: The mean (±SD) age of the patients was 56.5 (±10.1) years and 63.6% of them were male. MACEs included in-hospital death, cardiac arrest, cardiogenic shock, arrhythmia and left ventricular failure were observed in 6.4%, 3.6%, 19.5%, 5.5%, and 30.5% of the patients, respectively. Ninety-nine (45%) patients had one or more MACEs. Median (IQR) glycemic gap values were 38.5 (31.9-47.3) and 71.0 (61.0-84.3) in patients without any MACEs and patients with one or more MACEs, respectively ($p<0.001$). Median (IQR) glycemic gap values were 90.6 (86.0-97.9) and 52.6 (36.1-69.3) in expired and survived patients, respectively ($p<0.001$). The area under the receiver operating characteristics curve (AUROC) for admission glycemic gap values to predict in-hospital mortality was 0.895[95% confidence interval (CI) 0.768-1.000, $p<0.001$] and with the best cut-off value of 80.16, glycemic gap had sensitivity and specificity of 92.9% and 89.8%, respectively.The Area Under ROC for admission glycemic gap values to predict MACEs was 0.926 (95% CI 0.874-0.958) and with the best cut-off value of 53.19, glycemic gap had a sensitivity and specificity of 94.9% and 84.3%, respectively. Glycemic gap was an independent predictor of MACEs [odds ratio (OR): 1.11, 95% CI 1.08-1.14, $p <0.001$] and in-hospital mortality (OR: 1.09, 95% CI 1.05-1.14, $p <0.001$).

Conclusions: Elevated glycemic gap was significantly associated with an increased in-hospital mortality and other MACEs. So, glycemic gap can be used to assess the prognosis of hospitalized AMI patients with diabetes.

KEYWORDS: Glycemic gap; Diabetes; MACE; Acute myocardial infarction; Outcome.

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INTRODUCTION

Coronary artery disease (CAD) is a leading cause of death and disability worldwide and according to data from the Global Burden of Disease study, causing enormous medical costs and public health burden.[1,2] AMI is the most acute and critical manifestation of CAD and leads to substantial morbidity and mortality.[3] South Asian countries, including Bangladesh, have the highest prevalence of MI seen in those younger than 45 years of age compared to those older than 60 years.[4] So, improvements in MI care are crucial for reducing premature mortality. Current guidelines highlight the importance of early risk stratification for identifying patients at higher mortality risk requiring more aggressive care and therapy, selecting the optimal care site, and matching therapeutic intensity with risk. There are numerous markers and scores for prognosticating patients with AMI. Not many consider plasma glucose levels or glycemic variability.[5,6]

Hyperglycemia is a common finding in patients who present to hospitals suffering acute coronary syndrome (ACS). The prognostic role of hyperglycemia in non-diabetic patients with ACS is well established, compared to diabetic patients in whom it remains controversial, at least on a short-term basis.[7,8] In diabetic patients hyperglycemia is the cardinal feature that may be noticed regardless of a stressful event due to many causes, such as poor glycemic control.[9] Chronic hyperglycemia's consequences are linked to long-term organ malfunction, damage, and failure, particularly in the kidneys, heart, blood vessels, nerves, and eyes.[10] Stress-induced hyperglycemia commonly occurs in patients with critical illnesses, such as sepsis, multiple trauma, burn injuries, major surgeries, and AMI.[11,12] Stress hyperglycemia has been recognized as an important indicator of the severity of diseases, as it is closely associated with poor prognosis in a wide variety of pathologies.[13,14]

Because hyperglycemia is the cardinal feature of diabetes, it is necessary to consider pre-existing hyperglycemia in patients with diabetes when investigating the association between hyperglycemia and adverse outcomes. There is a well-known correlation between Glycosylated haemoglobin (HbA1c) and the long-term mean plasma glucose levels from the preceding three months. Estimated long-term average glucose level can be calculated from the HbA1c value, known as A1c-derived average glucose (ADAG). The glycemic gap is calculated by subtracting ADAG from plasma glucose at admission.[15] The glycemic gap may eliminate the influence of chronic hyperglycemia on the disease severity assessments in patients with diabetes and optimally improve the value of the assessment consequently.[16] Compared with admission blood glucose, the glycemic gap has been identified to be a superior indicator of stress hyperglycemia as it improves the accuracy of assessment by removing the impact of chronic hyperglycemia on the evaluation of disease severity.[17-22]

Diabetes is a serious public health concern that considerably impacts human life and health expenditures.[23] Bangladesh, similar to many other countries globally, is experiencing an increase in the prevalence of diabetes.[24] With increasing diabetes prevalence and an ageing population, it is expected that patients with diabetes presenting with ACS will create a significant burden on our healthcare system. To date, few published studies have investigated the effect of the glycemic gap on in-hospital outcomes in AMI patients, which warrants further prospective studies to validate the utility of this index in risk stratification of diabetic AMI patients. In this context, the present study aimed to comprehensively evaluate the role of the glycemic gap in predicting hospital outcomes of diabetic patients presenting with AMI to a cardiology unit of a tertiary-level hospital in Bangladesh. We hypothesized that e**levated glycemic** gap at admission is associated with the poor in-hospital outcome in patients with diabetes presenting with AMI.

MATERIALS AND METHODS

A prospective observational study was conducted in the Department of Cardiology of Chittagong Medical College Hospital, Chattogram, Bangladesh from March 2023 to February 2024. The study protocol was approved by the Ethical Review Committee of Chittagong Medical College and written informed consent was obtained from the participants.

Known diabetic patients, age more than 18 years of both sex, admitted to the hospital with a newly diagnosis of AMI- Type 1(STEMI & NSTEMI) & new onset LBBB were included in this study. Patient with anaemia, pregnancy, chronic kidney disease, hemoglobinopathy, polycythemia, liver failure, with history of blood loss, blood donation, and blood transfusion (within 3 month), Patient on steroid treatment, presenting with hypoglycemia and patients with previous history of PCI and CABG were excluded.

Considering 64% of the AMI patients would have favourable outcome, at 95% level of confidence with 10% allowable error from the expected proportion the calculated sample size was 216.[18] Finally, considering loss to follow-up cases, a total of 220 patients were included in this study.

A pretested structured case record form containing all the variables of interest was used for data collection. A twelve lead ECG was done in all patients with suspected ACS with diabetes at admission. Initial evaluation of the study population by age, sex, clinical history and examination was performed at admission. Risk factors of CAD like hypertension, smoking, dyslipidemia, diabetes mellitus, and obesity were noted. Blood sample was collected from all NSTE-ACS patients for high sensitivity Troponin I. HbA1c percentage was measured by using high performance liquid chromatography (HPLC) method. Random blood glucose level, hemoglobin and serum creatinine were measured in the laboratory at admission. Patients were followed till their hospital stay or death (which was earlier) to record the laboratory findings, treatment modalities used for the

patients, complications, and final outcomes. Different types of in-hospital data like hemodynamic conditions, heart failure, arrhythmia, conduction abnormalities, death, length of hospital stay etc. were noted during hospital stay

Only known diabetic cases diagnosed by a registered physician and treated with medication, diet and/ or exercise. Normoglycemia was considered when participants did not have diabetes or pre-diabetes.[25] AMI, STEMI and NSETMI were defined as per Schiele et al.[26] Based on definition for obesity for Asian population recommended by the WHO, BMI was categorized into two groups: Normal <27.5 kg/m^2 and elevated ≥ 27.5 kg/m^2).[27] Hypertension was defined as history of hypertension diagnosed and treated with medication or blood pressure ≥ 140 mmHg systolic and or ≥90 mmHg diastolic on at least two occasions. Dyslipidemia was diagnosed by history of dyslipidemia diagnosed and/or treated by a physician or had total cholesterol level ≥200mg/dl, low density lipoprotein cholesterol ≥130mg/dl, high density lipoprotein cholesterol level <40 mg/dl in male and <50 mg/dl in female or triglyceride level ≥150 mg/dl. Family History of CAD was considered if any direct blood relative (parents, siblings, children) who have had any of the following at age <55 years in men and <65 years in women: Angina, Myocardial infarction and sudden cardiac death without obvious cause. Current or recent smoker was defined as smoking cigarettes within 1 month of admission or stopped smoking between 1 month and 1 year before admission. Participants who stopped smoking >1 year ago or never smoked were categorized as Ex or never smoker. The glycemic gap was calculated from the glucose level measured at admission minus the ADAG level. The following formula was used to convert HbA1c levels to the estimated A1c-Derived Average glucose (ADAG) levels: 28.7 × HbA1c − 46.7.[15] In-hospital death, acute left ventricular failure, cardiac arrest, cardiogenic shock, and arrhythmia were considered as MACEs in the study.

Data were analyzed using SPSS (Statistical Package for Social Science) Windows version 23.0.Continuous data were expressed as mean ± standard deviation (SD) for normally distributed data or median and 25%–75% interquartile range (IQR) for non-normally distributed data. Categorical variables were presented as frequency (percentages) or proportions. Patients were divided into two groups based on their MACEs (had any MACEs or no MACEs) and based on survibility (survivors and non-survivors). Between these groups, continuous and categorical variables were analyzed. Independent sample t test was used to analyze normally distributed continuous variables and Mann-Whitney U test for non-normally distributed data. Categorical variables were compared by means of Chi-square test. Multivariate binary logistic regression analyses were performed to identify the independent predictors of MACEs and in-hospital mortality. Variables with a $p< 0.2$ in the univariate analysis were entered into the multivariate regression analysis and results were expressed as odds ratio (OR) with 95% confidence interval (CI) for the OR.The discriminatory values of glycemic gap for predicting in-hospital mortality and any MACEs were studied using receiver operating characteristic (ROC) curve analyses with calculation of area under the curve (AUC). Optimal cutoff value of the predictive parameters for predicting mortality and MACEs was defined by calculating Youden's index. Youden's index was a value at which the sum of sensitivity and specificity was maximum. Correlation between glycemic gap values and length of hospital stay was determined by Spearman's correlation coefficient. $P < 0.05$ was considered statistically significant.

RESULTS

A total of 238 patients screened, 18 were excluded (10 because of CKD, 5 because of overt liver failure, and 3 because of presenting with hypoglycemia) and 220 known patients with diabetes with AMI were included in this study. However, in-hospital outcome data were available for 220 patients and included in the analysis. Age ranged between 30 and 95 years with a mean (±SD) age of 56.5 (±10.1) years. More than one-third of the patients were in their 6th decade (37.3%), followed by 7th decade (29.5%). Out of 220 patients, 140 (63.6%) patients were male and 80 (36.4%) were female with a male to female ratio of 1.75:1. More than half (52.3%) were diagnosed as STEMI and rest of the 105 (47.3%) patients had NSTEMI. The most frequent risk factor was dyslipidemia in 140 (43.6%) patients, followed by hypertension present in 122 (55.5%) patients, smoking in 118 (53.6%), family history of CAD in 46 (20.9%), patients and obesity in 42 (19.1%) patients.

On admission, the mean and median glycemic gap values were 55.42 and 53.66, respectively, and the corresponding figures for RBS were 258.89 and 250 mg/dl, respectively. The most frequent complication was LVF (30.5%), followed by cardiogenic shock (19.5%) and cardiac arrest (3.6%). The median LOS in the hospital was four days, and the in-hospital mortality rate was 6.4% (14/220) (Table 1). MACEs included all-cause death, cardiac arrest, cardiogenic shock, arrhythmia and left ventricular failure in this study. Out of 220 patients, 121 (55%) had no MACEs during their hospital stay. Sixty-seven (30.5%), 23 (10.5%), 6 (2.7%), 2 (0.9%) and 1 (0.5%) patients had 1, 2, 3, 4, and 5 MACEs, respectively.

Table 1: Outcome of the hospitalized patients with AMI (n=220)

Outcome parameters	Frequency	Percentage
Different complications		
Left ventricular failure	67	30.5
Cardiogenic shock	43	19.5
Cardiac arrest	8	3.6
Atrioventricular block	7	3.2
First degree AV block	3	1.4
2:1 AV block	2	0.9
Complete AV block	2	0.9
Ventricular tachycardia	5	2.3
Ventricular fibrillation	3	1.4
Atrial fibrillation	4	1.8
Final outcome		
Survived and discharge	206	93.6
Expired	14	6.4
Length of stay in hospital, days		
Range	1.0-14.0	
Median (Interquartile range)	4.0 (3.0-5.0)	

The median (IQR) glycemic gap values were significantly higher patients with LVF than patients without LVF; in patients with cardiogenic shock than patients without cardiogenic shock; in expired patient than the survived patients; in patients with one or more MACEs than the patients without MACE (Table 2). A positive (Spearman's correlation coefficient rho=0.502) and significant ($p< 0.001$) correlation was found between admission glycemic gap values and length of stay (LOS) in hospital.

Table 2: Relation of glycemic gap with different outcome parameters

Outcome parameters	Glycemic gap Median (IQR)	P value*
Left ventricular failure		
Absent	43.0 (33.7-61.6)	<0.001
Present	70.3 (60.4-78.7)	
Cardiogenic shock		
Absent	45.8 (34.7-62.6)	<0.001
Present	81.2 (64.0-87.6)	
In-hospital mortality		
No	52.6 (36.1-69.3)	<0.001
Yes	90.6 (86.0-97.9)	
Any MACEs		
Absent	38.5 (31.9-47.3)	<0.001
Present	71.0 (61.0-84.3)	

*Mann-Whitney U test, IQR: Interquartile range

The area under the ROC curve for admission glycemic gap values to predict in-hospital mortality was 0.895 (95% CI 0.768-1.000) with a p-value of <0.001. Based on Youden's index, the best cut-off value of glycemic gap value for predicting in-hospital mortality was 80.16 with a sensitivity, specificity, positive predictive value and negative predictive value of 92.9%, 89.8%, 38.2%, and 99.7%, respectively.The area under the ROC curve for admission RBS to predict in-hospital mortality was 0.708 (95% CI 0.605 - 0.812) with a p-value of 0.009 (Figure 1).

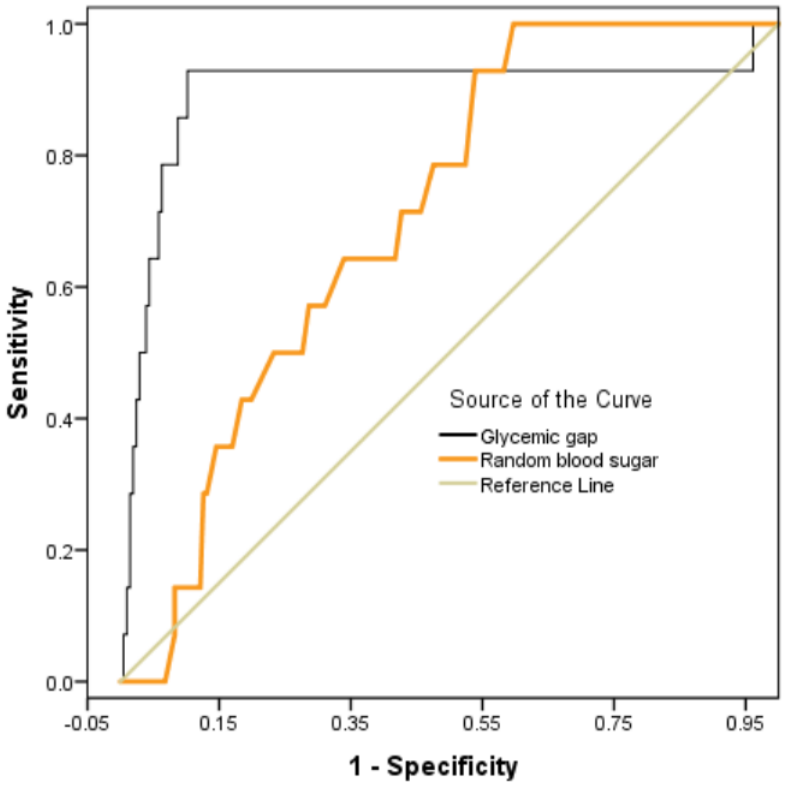

Figure 1: ROC curve of admission glycemic gap values to predict in-hospital mortality in hospitalized patients with AMI

The area under the ROC curve for admission glycemic gap values to predict MACEs was 0.926 (95% CI 0.874-0.958) with a p-value of <0.001. Based on Youden's index, the best cut-off value of glycemic gap value for predicting MACEs was 53.19 with a sensitivity, specificity, positive predictive value and negative predictive value of 94.9%, 84.3%, 83.2, and 95.3%, respectively.The area under the ROC curve for admission RBS to predict MACEs was 0.565 (95% CI 0.489-0.641) with a p-value of 0.097 (Figure 2).

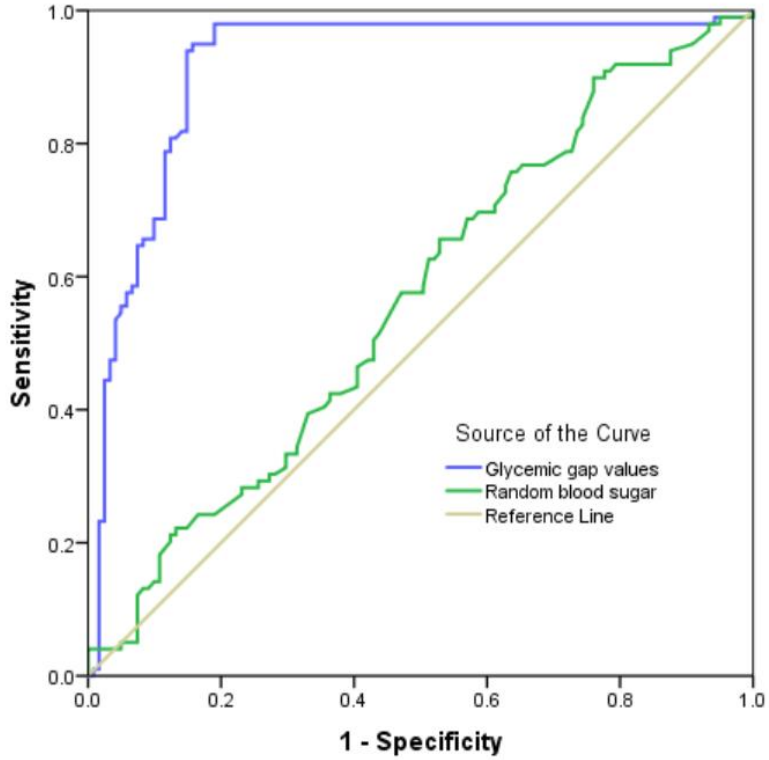

Figure 2: ROC curve of admission glycemic gap values to predict MACEs in hospitalized patients with AMI

Table 3 shows that, female sex, dyslipidemia STEMI, admission HbA1c and serum creatinine levels were associated with MACEs in univariate analysis (p<0.05). Age, and admission RBS levels were associated with in-hospital mortality in univariate analysis (p<0.05).

Table 3: Factors associated with MACEs in patients with AMI

Variables	Overall MACEs		P value	In-hospital mortality		P value
	Absent (n=121)	Present (n=99)		Survived (n=206)	Expired (n=14)	
Age, years	56.0±9.4	57.2±10.8	0.390*	56.1±9.7	62.5±12.9	0.021*
Sex						
Male	85 (70.2)	55 (55.6)	0.024†	134 (65.0)	6 (42.9)	0.095†
Female	36 (29.8)	44 (44.4)		72 (35.0)	8 (57.1)	
Risk factors						
Dyslipidemia	65 (53.7)	75 (75.8)	0.001†	129 (62.6)	11 (78.6)	0.230†
Hypertension	64 (52.9)	58 (58.6)	0.398†	112 (54.4)	10 (71.4)	0.214†
Smoking	64 (52.9)	54 (54.5)	0.807†	111 (53.9)	7 (50.0)	0.778†
FH of CAD	20 (16.5)	26 (26.3)	0.077†	44 (21.4)	2 (14.3)	0.539†
Obesity	22 (18.2)	20 (20.2)	0.704†	39 (18.9)	3 (21.4)	0.818†
AMI type						
STEMI	56 (46.3)	59 (59.6)	0.049†	105 (51.0)	10 (71.4)	0.138†
NSTMI	65 (53.7)	40 (40.4)		101 (49.0)	4 (28.6)	
Biochemical						
RBS, mg/dl	252.0 ± 62.7	267.3 ± 67.9	0.084*	256.6 ± 66.1	292.4 ± 43.1	0.047*
HbA1c, %	9.0 ± 2.3	8.4 ± 2.4	0.039*	8.7 ± 2.4	8.5 ± 1.5	0.732*
Hb, g/dl	14.3 ± 1.2	13.9 ± 1.7	0.103*	14.2 ±1.5	13.8 ± 1.0	0.352*
S. ceatinine, mg/dl	0.9 ±0.2	1.1 ±0.9	0.049*	1.0 ± 0.7	1.0 ± 0.2	0.837*

Data were expressed as Mean±SD or Frequency (%). MACE: Major adverse cardiac events, CAD: Coronary artery disease, AMI: Acute myocardial infarction, STEMI: ST segment elevation myocardial infraction, NSTEMI: non ST segment elevation myocardial infraction, RBS: Random blood sugar, Hb: Hemoglobin. *Independent sample t test.†Chi-square test.

Variables those with p <0.2 by univariate analysis were tested in a binary multivariate regression analysis to determine the independent predictors of MACEs and of in-hospital mortality in patients with AMI (Table 4). The Table depicted that, female sex (OR: 2.63, 95% CI 1.12-6.13, p= 0.026) and admission glycemic gap value (OR: 1.11, 95% CI 1.08-1.14, p <0.001) retained significant association with MACEs in the adjusted analysis (p<0.05). Age (OR: 1.09, 95% CI 1.01-1.76, p= 0.025) and admission glycemic gap value (OR: 1.09, 95% CI 1.05-1.14, p <0.001) retained significant association with in-hospital mortality in the adjusted analysis (p<0.05).

Table 4: Independent predictors for MACEs and in-hospital mortality by multivariate analysis

Variables	Overall MACEs		In-hospital mortality	
	OR (95% CI)	P value	OR (95% CI)	P value
Age, years	--	--	1.09 (1.01-1.78)	0.025
Female vs. Male	2.63 (1.12-6.13)	0.026	2.80 (0.72-10.98)	0.139
Dyslipidemia	1.18 (0.51-2.75)	0.695	--	--
FH of CAD	1.93 (0.75-4.99)	0.173	--	--
STEMI vs. NSTEMI	1.20 (0.53-2.76)	0.665	1.19 (0.63-3.52)	0.555
RBS, mg/dl	1.00 (0.99-1.07)	0.816	1.01 (0.99-1.02)	0.280
Creatinine, mg/dl	8.21 (1.00-67.14)	0.051	--	--
Glycemic gap value	1.11 (1.08-1.14)	<0.001	1.09 (1.05-1.14)	<0.001

B: Beta coefficient, OR: Odds ratio, CI: Confidence interval, RBS: Random blood sugar, FH: Family history, CAD: Coronary artery disease, STEMI: ST segment elevation myocardial infraction, NSTEMI: non ST segment elevation myocardial infraction

DISCUSSION

The significant findings of the present study were as follows: compared with RBS, the glycemic gap was able to predict in-hospital mortality and MACEs; a glycemic gap ≥80.16 and 53.19 was associated with significantly higher in-hospital mortality and MACEs, respectively.

Regarding the demographic and clinical presentation of the AMI patients in the present study have found that majority of patients (63.6%) were male with a mean age of around 56.5 years. The study showed that 53.6% patients were smoker, 55.5% of the patients had hypertension, and 63.6% had dyslipidemia. Similar demographic and risk factors distribution were also reported by other studies conducted in other tertiary hospital of Bangladesh.[28-30]

Out of 220 patients with AMI, the most frequent in-hospital complication was LVF (30.5%), followed by cardiogenic shock (19.5%) and cardiac arrest (3.6%) in the present study. All-cause death, cardiac arrest, cardiogenic shock, arrhythmia, LVF and atrioventricular block were considered in this study. More than half (55%) of patients had no MACEs during their stay in the hospital, and 30.5%, 10.5%, 2.7%, 0.9%, and 0.5% of patients had 1, 2, 3, 4, and 5 MACEs, respectively. The in-hospital mortality rate was 6.4% in the present study. In the study of Liao et al., of 331 patients, 13.0% and 18.4% died during hospitalization and experienced MACEs.[20] Cardiac arrest (6%), pulmonary oedema (24%) and life-threatening dysrhythmia (13%) are fatal complications that occurred following ACS in the study by Ghamin et al.[18]

In the present study, patients with diabetes who suffered MACE had a significantly higher glycemic gap compared to patients who did not have MACE, which agreed with the study of Ghanem et al.[18] When only mortality outcome was evaluated in the present study, non-survivors had a statistically significant higher glycemic gap compared with survivors. The median (IQR) glycemic gap values were 90.6 (86.0-97.9) and 52.6 (36.1-69.3) in expired and survived patients, respectively. In the study of Liao et al. (2016), mean ±SD glycemic gap values were 58.3±84.8 and 95.7±119.8, respectively, among survivors and non-survivors.[20]

A moderate positive (rho=0.502) and significant (p< 0.001) correlation was found between admission glycemic gap values and LOS in hospital in the present study, which indicated a longer hospital stay for the patients with higher glycemic gap. Present study findings similar with the study of Ghanem et al., where a significant positive correlation was found between glycemic gap value and the length of hospital stay of ACS patients with diabetes.[18]

Present study demonstrated an excellent discriminating ability of the admission glycemic gap value for occurrence of any MACEs. The ROC curve for admission glycemic gap values to predict MACEs was 0.926. Based on Youden's index, the best cut-off value of glycemic gap value for predicting MACEs was 53.19 with a sensitivity, specificity, PPV, and NPV of 94.9%, 84.3%, 83.2, and 95.3%, respectively. The AUROC for admission glycemic gap was better than the admission RBS levels (0.565) to predict MACEs. A few studies have focused on the prognostic value of glycemic gap in diabetic patients with AMI. Liao et al. found that compared with admission blood glucose level, glycemic gaps showed greater AUROC values (0.591) for MACEs occurrence.[20] They determined an optimal cutoff value of 42mg/dL using the maximal Youden's index with a sensitivity, specificity, PPV and NPV of 68.9%, 50.7%, 23.9% and 50.4%, respectively, for occurrence of MACEs.[20] Glycemic gap had a good discrimination power (AUROC: 0.75) in predicting in-hospital death and performed better than admission glucose levels in patients with ICH in the study of Zarean et al.[31] ROC analysis indicated that mean glycemic gap was the best glycemic indicator to detect adverse outcomes, with the AUC of 0.611 for MACEs in the study of Wu et al.[32]

Regarding in-hospital mortality, the ROC curve for admission glycemic gap values was 0.895 in the present study. Youden's index revealed 80.[16] as the best cut-off value of glycemic gap for predicting in-hospital mortality, with a sensitivity, specificity, PPV, and NPV of 92.9%, 89.8%, 38.2%, and 99.7%, respectively. Previously, Laio et al. found that, critically ill patients with diabetes and a glycemic gap ≥80 mg/dL had significantly higher ICU mortality and adverse outcomes than those with a glycemic gap <80 mg/dL.[20] Similar cut-off value of admission glycemic gap >80 mg/dl) was reported by Dorn et al., which was associated with in hospital mortality and poor discharge status in the patients with ICH.[17] Glycemic gap mean had the greatest predictive power with an AUC of 0.820, the cut-off value was 3.60 mmol/L (sensitivity 78.2% and specificity 77.3%) in the study of Lou et al., which included 502 critically ill diabetic patients admitted to ICU.[21] ROC analysis indicated that mean glycemic gap was the best glycemic indicator to detect adverse outcomes, with the AUC of 0.614 for all-cause mortality in patients with STEMI in the study of Wu et al.[32]

In the present study, on performing regression analysis, glycemic gap value was an independent predictor of MACEs and in-hospital mortality among patients with diabetes with AMI. Similar to the present study, glycemic gap was an independent predictor of MACE occurrence in patients with diabetes with ACS in the study of Ghanem et al.[18] The acute glycemic gap was an independent risk factor for longer ICU stay and 28-day mortality rate in the study of Ha et al., which

enrolled 36 critically ill patients admitted to the medical ICU.[33]

LIMITATIONS

It was a hospital-based study where all participants were of the same ethnicity; therefore, the findings may not generally apply to other populations. The study highlighted the complications that occurred during the hospital stay only, providing us with short-term follow-up of patients for a maximum of 2 weeks. This limitation prevents the study from giving information about long-term outcomes.

CONCLUSION

In conclusion, elevated glycemic gap at admission blood was associated with an increased risk of in-hospital mortality and other MACEs in patients with diabetes presenting with AMI.

RECOMMENDATION

Based on the present study findings, it could be suggested that the glycemic gap could be considered to be included in the risk stratification of AMI patients with diabetes. Considering the limitations of the present study, glycemic gap could be further studied as an adjunct assessment to determine the prognosis and severity of patients with diabetes presenting with AMI. The association between the glycemic gap, chronic glycemic controls and the outcomes should be further explored in prospective multi-centre longitudinal studies.

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