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A Study to Evaluate Correlation of Blood Sugar Level and Glycosylated Haemoglobin at the Time of Admission with Severity of Acute Coronary Syndrome in Diabetic Patients

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Abstract

Aim: To study the clinical profile of diabetic patients who present with Acute Coronary Syndrome (ACS) for the first time, to correlate the Blood Sugar Level (BSL) and Glycosylated hemoglobin (HbA_{1C}) at the time of admission and the severity of acute coronary syndrome; and to assess the correlation between tight glycemic control of diabetics based on HbA_{1C} estimation and presence of end organ damage in diabetics. **Materials and Methods:** The study was undertaken at our medical college in the medicine department. 64 adult patients who are known diabetics or detected for the first time presenting in outpatient department or emergency department as acute coronary syndrome were studied. Study period was 2 years from January 2011 to December 2012. **Results:** The study showed a definite male preponderance, with 56.23% males as compared to 43.73% females. Atypical presentations of acute coronary syndrome were more common as compared to typical chest pain (34.37%). Chest pain commonly is prevalent in younger age group. 95.30% of the patient had some or other associated risk factors like hypertension (59.37%), smoking (26.56%), obesity (15.62%) or dyslipidemia (65.62%). ST elevation MI was the commonest presentation (73.40%) and involvement of anterior wall was common (36.20%). On admission BSL (Blood Sugar Level) was not found to have a definite prognostic value in predicting outcome in diabetic patients with acute coronary syndrome. Impaired glycosylated haemoglobin was found to be an independent risk factor and had a definite prognostic value in predicting outcome. Diabetic patient with acute coronary syndrome had LV dysfunction, cardiac rhythm abnormalities, cardiogenic shock and are likely to be readmitted, thus having worst morbidity as well as mortality. **Conclusion:** The primary aim of this study was to study correlation of blood sugar level and glycosylated haemoglobin at the time of admission with severity of acute coronary syndrome and to study clinical profile of diabetic patients with due consideration to complications which are related to diabetes.

Keywords: Acute Coronary Syndrome, Blood Sugar Level, Dyslipidemia, Glycosylated Hemoglobin

1. Introduction

With ever increasing incidences of Diabetes, it has become one of the major global health problems. Presently its prevalence has been reported as 13-15 % in urban areas of India. Some workers believe that, equal numbers of undiagnosed diabetics are present in India, while others have reported nearly 12% yearly increase in diagnosed cases of diabetics in our country[1].

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The World Health Organization (WHO) estimated that by 2025, worldwide there will be 300 million diabetics (5.4%). India by then will be home to more than 57 million diabetics, this will be the largest number compared to other countries world over. Presently diabetic population in India is estimated to be approximately 32 million[2]. South-East Asia has the highest prevalence of diabetes. In 2006, Goyal and Yusuf estimated that the prevalence was 3.8% in rural areas and 11.8% in urban areas[3]. Similarly, IC Health reported a prevalence of 14% in an Indian urban setting in 2000[4]. According to the INTER-HEART study, 11.8% of all acute coronary events in the South Asia region result from diabetes[5]. Diabetes is a disease of complications. With better control of metabolic and infective complications, diabetes has predominantly become a disease of cardiovascular system[1]. Diabetes mellitus, whether type 1 or type 2 is a very strong risk factor for development of coronary heart disease and stroke, 80% of all death in diabetics is due to atherosclerosis, compared with approximately 30% among non-diabetics. Among all hospitalizations for diabetic complications, more than 75% present are consequence of atherosclerosis. Diabetes accelerates the natural course of atherosclerosis in all groups of patients and involves a greater number of coronary vessels with more diffuse atherosclerotic lesion[6].

Different types of hyperglycemia like pre-existing diabetes mellitus, IFG (Impaired Fasting Glucose), IGT (Impaired Glucose Tolerance), and stress hyperglycemia and new onset diabetes are usually common with Acute Coronary Syndrome (ACS). In present day diabetes is usually considered as disease of heart, diagnosed by estimation of blood sugar and recently by glycosylated haemoglobin. Considering the fact that majority of type 2 diabetes has cardiovascular complication either before or after diagnosis, and definitely on long run. Many studies have proved that, tight glycemic control can lower the macro vascular complications like Coronary Artery Disease (CAD), Peripheral Vascular Disease (PVD), and Cerebro-Vascular Accidents (CVA) etc. But in our country proper assessment of the existent and follow-up management of diabetes during acute coronary syndrome is still underdeveloped.Care of the diabetic related complications is considered as like the care of `neglected step child'. Without successful control of DM, effective result in acute coronary syndrome treatment is impossible, both during acute state and during follow up. Diabetes exerts a deleterious effect on course of acute coronary syndrome through diverse pathologies during a short and long course of treatment. Some of the complications like Cardiomyopathy cannot be modified at the time of presentation.

As patient with diabetes are at greater risk, application of effective preventive and treatment measures may result in large survival benefit. Large multi-centric studies like have stressed more on tight glycemic control in determining the prognosis of acute coronary event in diabetics, Hence we study the clinical profile of diabetic patients who presented with acute coronary syndrome and to look for correlation of on admission BSL (Blood Sugar Level) and glycosylated hemoglobin with the short term clinical severity in the same patients.

2. Materials and Methods

The study was undertaken at our medical college in medicine department. 64 patients who are known diabetics or detected for the first time presenting in outpatient department or emergency department as acute coronary syndrome were studied. Study period was 2 years from January 2011 to December 2012. Case study was descriptive.

All adult patients who were diagnosed to have acute coronary syndrome based on clinical evaluation of their history, physical examination, an electrocardiogram and cardiac biomarkers and who are known diabetics on regular/irregular or no treatment and diagnosed as diabetics for the first time were included in the study. Patients with previous history of acute coronary syndrome or ECG showing old myocardial infarction were excluded from the study.

2.1 Diagnostic Criteria for Diabetes Mellitus

- Symptoms of diabetes plus random blood glucose >200 mg/dl.
- Fasting=> (126 mg/dl)/(7.0 mmol/l).
- HbA_{1c} level > 6.5%.

Acute coronary syndrome is unifying term representing a common end result which is acute myocardial ischemia; it includes acute myocardial infarction (resulting in ECG changes of ST elevation or non-ST elevation) and unstable angina[7].

3. Results

In our study occurrence was found to be 1.2 times more common in men. Males were 56.23% of total populations and females were 43.73% (Table 1).

Table 1. Showing age and sex wise distribution of diabetic patient with acute coronary syndrome

Age Group (In Years)	Male	Percentage (%)	Female	Percentage (%)
41-50	6	9.37	8	12.50
51-60	15	23.43	2	3.12
61-70	11	17.18	15	23.43
71-80	4	6.25	3	4.68
TOTAL	36	56.23	28	43.73

Table 2. Showing age and symptom wise distribution of patients

SYMPTOMS	41-50 years	51-60 years	61-70 years	71-80 years	Total	%
Chest Pain	7	7	8	0	22	34.37
Breathlessness	2	3	7	1	13	20.30
Nausea/Vomiting	2	4	5	3	14	21.87
Fainting	2	2	4	2	10	15.62
Sweating	3	6	6	1	16	25.00
Burping	2	1	5	2	10	15.62

In our study majority of patients who were presented had atypical presentation. Chest pain was present in 34.37%. Out of atypical presentation sweating was 25%, followed by nausea/vomiting (21.87), breathlessness (20.30%), Fainting (15.62%) and Burping (15.62%). Atypical presentation was predominant in older age groups (Table 2).

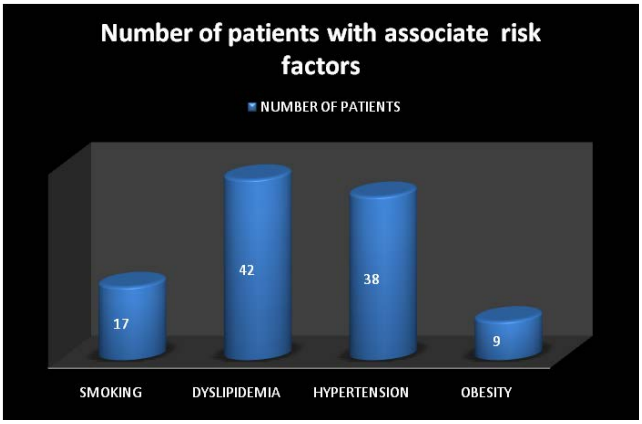
Table 3. Showing distribution of patient with acute coronary syndrome with known diabetes and with diabetes diagnosed for the first time during present admission

Diabetes Status	Number of Patient (N=64)	Percentage
Known Diabetics	40	62.5%
Diagnosed for First Time	24	37.5%

In our study, a known diabetic patient constitutes 62.5% as compared to 37.5% patients diagnosed for the first time during present admission (Table 3).

In our study, out of known diabetic patients, 70% were on oral hypoglycemic agents and 30% were on insulin therapy.

Out of 64 patients presented in our study 61 patients (95.30%) had some or other associated risk factors. 22(34.37%) had one associated risk factor, 33(51.56%) had two associated risk factors and 6(9.37%) had three or more associated risk factor's.



Graph 1. Showing distribution of associate risk factors.

In our study, 65.62% patients had dyslipidemia, 59.37% had hypertension, 26.56% were smokers and 15.62% were obese (Graph 1).

In our study, out of patients with ST elevation MI (47), 17 (36.20%) patients presented with anterior wall MI, 12(95.50%) patients presented with inferior wall MI, 11(23.50%) patients presented with lateral wall MI and 7(14.80%) patients presented with antero-lateral MI.

In our study, 19(29.6%) patients were in Killip class II and III.

18(28.12 %) patients were in Killip class I and 8(12.5%) patients were in Killip class IV.

In our study mean value of glycosylated haemoglobin among patients was 9.09±1.24 gm% and mean value of on admission blood sugar level was 254.32+64.16mg/dl (Table 4).

Table 4. Showings mean value of blood sugar level and glycosylated haemoglobin

Parmeter	Mean Value	SD
Mean Value of Glycosylated Hemoglobin (%)	9.09	1.24
Mean Value of Blood Sugar Level (Mg %)	254.32	64.16

In our study, maximum number of patients had blood sugar level more than 301 mg% on admission out of that group maximum number of patients belonged to Killip class I and III (29.6% each).

In patients with Killip class IV, maximum number of patients had blood sugar level ranging from 150-200 mg% on admission.

There was no significant difference in the mean blood sugar levels in various killip classes showing no association between killip class and blood sugar level on admission.

Pearson correlation coefficient = -0.061, p = 0.633, non-significant

Table 5. Showing correlation between on admission blood sugar level and ejection fraction (EF) by 2D-echocardiography

EF / BSL (in mg/dl)	21-25 (%)	26-30 (%)	31-35 (%)	36-40 (%)	41-45 (%)	46-50 (%)	51-55 (%)	>=56 (%)	TOTAL
150-200	2	4	0	5	0	1	3	1	16
201-250	0	1	1	7	2	3	1	0	15
251-300	1	3	1	6	0	1	2	1	15
>301	1	4	0	7	4	1	0	1	18
TOTAL	4	12	2	25	6	6	6	3	64

Table 6. Showing association between on admission blood sugar level and left ventricular diastolic dysfunction by 2-dimensional echocardiography

BSL (mg/dl)	Grades of Diastolic Dysfunction (DD)				No DD	Total
	1	2	3	4		
150-200	1	5	3	1	5	15
201-250	5	4	0	0	6	15
251-300	9	1	0	1	4	15
>301	7	3	1	1	7	19
TOTAL	22	13	4	3	22	64
MEAN	271.63	241.38	208.50	262.66	251.86	254.32
SD	50.81	82.45	69.88	65.73	62.79	64.16

ANOVA applied, f = 1.068, p = 0.381, non significant

In our study, maximum number of patients belongs to group having blood sugar level more than 301 mg% on admission 18(28%).Out of that maximum 7 patient had ejection fraction between 36-40 % (Table 5).

Patients with EF<30% majority of them belongs to BSL range of 150-200 mg/dl (37%) and >301 mg/dl (31.2%) on admission.

As the correlation coefficient was non-significant, we can conclude that there is no significant correlation between BSL and ejection fraction at the time of admission.

In our study, majority 18(28%) of patient had blood sugar level more than 301mg/dl on admission (Table 6).

In patients of BSL ranging between 251 to 300 mg/dl majority i.e., 11 (73.3%) had LV diastolic dysfunction.

There is no significant difference in the mean blood sugar levels in various LV diastolic dysfunction grades. So there is no significant association between LV diastolic dysfunction and blood sugar level at the time of admission.

Table 7. Showing association between on admission blood sugar level and mortality

BSL(mg/dl)	Mortality	Survival	Total
150-200	4	12	16
201-250	0	15	15
251-300	1	14	15
> 301	4	14	18
TOTAL	9	55	64
MEAN	250.77	254.90	254.32
SD		63.74	64.16

Z = 0.16, P> 0.05, non significant

Highest mortality (25%) was seen in patients with BSL levle150-200 mg/dl. But there was no significant statistical association between on admission BSL and mortality (Table 7).

In our study maximum 16 (25%) had glycosylated haemoglobin in the range of 8.6 to 9.0 %, out of that group maximum 6(37%) were in killip class I.

Table 8. Showing association between on admission glycosylated haemoglobin and clinical severity using killip classification

HbA_{1c} (%)	KILLIP Class I	KILLIP Class II	KILLIP Class III	KILLIP Class IV	Total
≤7	2	1	0	0	3
7.1-7.5	3	0	0	0	3
7.6-8.0	4	3	3	1	11
8.1-8.5	2	1	1	0	4
8.6-9.0	5	6	3	2	16
9.1-9.5	1	3	1	0	5
9.6-10	1	2	5	0	8
10.1-10.5	0	3	2	1	6
10.6-11	0	0	2	2	4
11.1-11.5	0	0	2	2	4
TOTAL	18	19	19	8	64
MEAN	8.18	8.98	9.62	10.15	9.09
SD	0.82	0.95	1.19	1.47	1.24

ANOVA applied, f = 8.50, p<0.001, significant

Table 9. Showing co-relation between on admission glycosylated haemoglobin and Ejection Fraction (EF) by 2D-echocardiography

HbA1c (In %)	Ejection Fraction (IN %)								TOTAL
	21-25	26-30	31-35	36-40	41-45	46-50	51-55	>56	
≤7	0	0	0	1	0	1	1	0	3
7.1-7.5	0	0	0	1	1	1	0	0	3
7.6-8.0	1	1	0	8	0	0	0	1	11
8.1-8.5	0	0	0	2	1	0	1	0	4
8.6-9.0	1	3	0	7	0	1	2	2	16
9.1-9.5	0	0	1	2	1	0	1	0	5
9.6-10	0	2	0	3	1	1	1	0	8
10.1-10.5	0	3	1	0	0	2	0	0	6
10.6-11	2	2	0	0	0	0	0	0	4
11.1-11.5	0	1	0	1	2	0	0	0	4
TOTAL	4	12	2	25	6	6	6	3	64

Pearson correlation coefficient = -0.24, p = 0.057, non-significant

Table 10. Showing correlation between glycosylated haemoglobin and left ventricular Diastolic Dysfunction (DD) by 2D-echocardiography

HbA1c (In %)	Grade of DD				No Diastolic Dysfunction	Total
	1	2	3	4		
≤7	1	-	-	-	2	3
7.1-7.5	2	-	-	-	1	3
7.6-8.0	7	-	-	2	2	11
8.1-8.5	2	-	-	-	2	4
8.6-9.0	7	1	-	-	8	16
9.1-9.5	2	1	-	-	2	5
9.6-10	1	5	-	1	1	8
10.1-10.5	-	4	-	-	2	6
10.6-11	-	1	3	-	0	4
11.1-11.5	-	1	1	-	2	4
Total	22	13	4	3	22	64
Mean	8.35	10.12	11.22	8.4	8.94	9.09
SD	0.73	0.66	0.45	1.30	1.22	1.24

ANOVA applied f=13.01, p< 0.001, significant

Those with glycosylated haemoglobin less than 7.6% none were in the Killip class III and IV (Table -8).

There was significant difference in the mean glycosylated haemoglobin levels in various killip classes. So we can conclude that there is significant association between glycosylated haemoglobin and killip classes.

In our study maximum number of patient had glycosylated haemoglobin in range 8.6-9.0 %. Majority of them had EF between 36-40 %.

Table 11. Showing association between glycosylated haemoglobin and mortality

HbA1c (In mg%)	Mortality	Survival	Total
≤ 7	0	3	3
7.1-7.5	0	3	3
7.6-8.0	2	9	11
8.1-8.5	0	3	3
8.6-9.0	2	16	18
9.1-9.5	0	5	5
9.6-10	1	6	7
10.1-10.5	0	6	6
10.6-11	3	1	4
11.1-11.5	1	3	4
Total	9	55	64
Mean	9.76	8.98	9.09
SD	1.56	1.17	1.24

Z = 1.43, p>0.05, non significant

Those patients with EF < 35% invariably had glycosylated haemoglobin value more than 7.5% (Table 9).

As correlation coefficient is non-significant, we can conclude that there is no correlation between on admission glycosylated haemoglobin level and ejection fraction.

In our study, the maximum number of patients had glycosylated haemoglobin in the range of 8.6-9.0 % (28.12%) (Table 10).

We found in our study that range of glycosylated haemoglobin 7.6-8.0 % had maximum (9 out of 11) 81.8% percentage of patient with LV diastolic dysfunction.

Glycosylated haemoglobin range of >9.1 had majority of patients 20 out of 27 (74%) were associated with LV diastolic dysfunction.

As correlation coefficient is significant, we can conclude that there is significant correlation between on admission glycosylated haemoglobin level and grades of diastolic dysfunction.

In our study, glycosylated haemoglobin range 10.6-11 gm% had maximum patients having highest mortality 3 (33.3%), which is closely followed by glycosylated haemoglobin range 8.6-9 gm% and 7.6-8.0 gm% (2 in each) (Table 11).

There was no significant association between mean glycosylated haemoglobin and mortality (p>0.05)

Table 12. Showing cardiovascular complications

Cardiovascular Complication	No. of Patients	Percentage (%)
Lv Dysfunction	42	65.62
Hypotension	15	23.43
Cardiogenic Shock	15	23.43
Sustained Ventricular Tachycardia	17	26.56
3^0 Heart Block	06	9.37
Mitral Regurgitation	05	7.81
Readmission	28	43.75

Majority of patients in our study had LV diastolic dysfunction (65.6%) (Table 12).

26.56 % (17) patients had sustained ventricular tachycardia, 23.43 % (15) had hypotension, 23.43% (15) had cardiogenic shock, 3^o heart block was present in 9.37% (06) followed by mitral regurgitation in 7.81 % (5).

43.7 % (28) of patients were readmitted subsequently after discharge due to precipitation of symptoms within period of 15 days.

Most common diabetic related complication associated with patients was neuropathy (56.25%) followed by retinopathy (32.81%) followed by nephropathy (21.81%) followed by stroke (3.12%).

In our study patients with nephropathy invariably had retinopathy, this type of association was not found amongst other complications of diabetes.

Those patients with glycosylated haemoglobin <7.6 were not associated with complication related to diabetes. Those with value >8.6 were invariably associated with either micro or macro-vascular complications related to diabetes. Majority of them had more than one complication's.

Retinopathy and nephropathy was most prevalent amongst patient with duration of diabetes 6-15 years, this duration group is also associated with maximum complications related to diabetes.

5. Discussion

Diabetes mellitus is a major risk factor for cardiovascular disease. The increase in incidence of cardiovascular disease in diabetes has been attributed in majority to the acceleration of coronary atherosclerosis, which occurs at an earlier age in diabetics as compared to non diabetics and advances more rapidly to clinical cardiovascular events in them. As coronary heart disease in diabetes is often diffuse and there is progressive increase in stenosis of coronary arteries, due to autonomic neuropathy detection of narrowing of coronary lumen is often impaired, reducing the symptom of ischemic heart disease and delayed detection which leads to bad prognosis. In addition to that, diabetic individuals are faced with increased incidences of restenosis and subsequently mortality following revascularization procedures especially for Percutaneous Transluminal Coronary Angioplasty (PTCA). Multivariate analysis of a number of large prospective studies with follow-up for years like the Framingham study, the multiple risk factor intervention trial, and the nurses health study have shown that diabetes is associated with 2 to 5 fold increase in cardiovascular related morbidity as well as mortality.

In our study, the mean age of presentation was 60.38±8.9 years. Maximum numbers of patients were in the age group 51 to 70 years[8,9]. The occurrence was found to be 1.3 times more common in men. Mean age of presentation of acute coronary syndrome for females was 60.2±9.6 years, slightly earlier as of males which was 60.4±8.3 years[8,9]. In our study majority of patients presented had atypical presentation. Chest pain was present in 34.37%. Out of atypical presentation sweating was 25%, followed by nausea/vomiting (21.87%), breathlessness (20.30%), fainting (15.62%) and burping (15.62%). Atypical presentation was predominant in older age groups[10]. As it was found in our study, majority of the atypical presentation was in elderly age group. In our study, known diabetics were 62.5% as compared to 37.5%, who were diagnosed for the first time[8]. In our study, 95.31% of patients had some or other associate risk factors. 46.8% had at least 1, 40.7% had 2 risk factors and 7.8% had 3 risk factors. 65.6% had dyslipidemia, 59.3% had hypertension, 26.5% were smokers and 15.62% were obese[9]. In our study, 73.4% had ST elevation MI and 26.6% had Non-ST Elevation MI. Out of patients with ST elevation MI, We had 36.2% patients with anterior wall MI, 25.5% were with inferior wall MI, 23.5% with lateral wall MI, 14.8% with antero-lateral wall MI[16]. In our study, 29.6 % were in Killip class **II** and **III** and 28.12% were in Killip class **I**,12.5% were in Killip class **IV**[9,16]. The mean value of glycosylated hemoglobin was 9.09±1.24 gm%[8]. The mean value of on admission blood sugar level was 254.32±64.16 mg/dl. In our study, majority of patient had blood sugar level more than 301 mg/dl on admission. Majority of patients belonged to Killip class 2 and 3 (29.6% each). Those patients with Killip class IV, majority of them had blood sugar level ranging from 150-200 mg/dl on admission. Killip class IV directly correlates with cardiac morbidity and mortality, this association was found to be non-significant in our study and hence on admission blood sugar level does not have prognostic value based on clinical severity. In our study, majority of patient had blood sugar level more than 301 mg/dl on admission 18(28%). Majority of patient had ejection fraction between 36-40 %.Those with EF<30% majority of them belongs to BSL level of 150-200 mg/dl (37%). Ejection fraction on lower side correlates with cardiac morbidity and mortality and in our study this correlation found to be non-significant and hence on admission blood sugar level does not have prognostic value based on ejection fraction. In our study, majority 18(28%) of patient had blood sugar level more than 301 mg/dl on admission.In patients of BSL range between 251 to 300 mg/dl majority 11 (73.3%) had LV dysfunction.LV dysfunction correlates with cardiac morbidity and mortality. As this association was non-significant in our study hence on admission blood sugar level does not have a prognostic value based on left ventricular dysfunction. In our study, BSL class 150-200 and >301 mg% found to be associated with mortality in equal proportion contributing 4 out of 9 (44.4%) from each class. This correlation was found to be non-significant[11–13]. In our study majority 16 (25%) had glycosylated haemoglobin in the range of 8.6 to 9.0 %. Those with killip class IV majority of them had glycosylated haemoglobin range >10% indicating poor glycemiccontrol. Those with glycosylated haemoglobin less than 7.6% indicating good glycemic control none were in the Killip class III and IV. Killip class IV directly correlates with cardiac morbidity, this association was found to be statistically significant hence on admission glycosylated haemoglobin does

have a prognostic value based on clinical severity. In our study majority of patienthad glycosylated haemoglobin in range 8.6-9.0 %. Majority of them had EF between 36-40 %.Those with EF<35% had glycosylated haemoglobin more than 7.5%. Those with glycosylated haemoglobin less than 7.5 indicating good glycemic control, none had ejection fraction less than 35% ejection fraction on lower side correlates with cardiac morbidity and mortality, this correlation was found to be statistically non-significant. Hence glycosylated haemoglobin does not have prognostic value based on ejection fraction. In our study, the majority of patient with glycosylated haemoglobin were in the range of 8.6-9.0 % (28.12%). Out of them majority showed no LV dysfunction (55.5%). We found in our study that range of glycosylated haemoglobin between 7.6-8.0 % was associated with significant LV diastolic dysfunction. Glycosylated haemoglobin range of >9.1 was significantly associated with LV dysfunction 20(74%). LV diastolic dysfunction correlates with cardiac morbidity and mortality, in our study this association was found to be significant and hence glycosylated haemoglobin has a prognostic value based on left ventricular diastolic dysfunction. In our study, glycosylated haemoglobin range 10.6-11 found to be major group having highest mortality 3 (33.3%), which is closely followed by 8.6-9 and 7.6-8.0 which is indicating poor glycemic control and survival was 100% in those with glycosylated haemoglobin less than 7.5% indicating good glycemic control and hence glycosylated haemoglobin has prognostic value in predicting the mortality[14,15], but no statistical significance found in our study. Impaired glycosylated haemoglobin was found to be an independent risk factor and had significant prognostic value while considering outcome in diabetic patients with acute coronary syndrome.Majority of patients in our study had LV dysfunction (65.62%).

26.56% patients had sustained ventricular tachycardia, 23.43% had hypotension and 23.43% cardiogenic shock, 3° heart block was present in 9.37% followed by mitral regurgitation in 7.81%. 43.75% of patients were readmitted subsequently after discharge over a period of 15 days due to precipitation of symptoms. Diabetes is also a risk factor for cardiogenic shock in settings of acute ischemic syndrome. Diabetes remains an independent predictor for a poor prognosis. In the Thrombolysis and Angioplasty in MI (TAMI) trials, in hospital mortality rates was nearly twice in patients with diabetes, and more patients had congestive heart failure. Most common diabetic related complication associated with patients was neuropathy (56.25%) followed by retinopathy (32.81%), nephropathy (21.8%) and stroke (3.12%)[16,17]. Those with value of glycosylated haemoglobin above 8.6 invariably had associated diabetic micro or macro-vascular complications and most of them had more than one diabetes related complications. Those with long standing duration of diabetes invariably had multiple micro or macro vascular complications and newly diagnosed diabetic presenting with vascular complication more often had multiple risk factors.

6. Conclusion

This study was carried out during the period Jan 2011 to Dec 2012. The primary aim of this study was to study correlation of blood sugar level and glycosylated haemoglobin at the time of admission with severity of acute coronary syndrome and to study clinical profile of diabetic patients with due consideration to complications which are related to diabetes.

From our study following conclusions were drawn

- There was a definite male preponderance, with 56.23% males compare to 43.73% females.
- Atypical presentations of acute coronary syndrome were more common as compared to typical chest pain (34.37%).Chest pain commonly prevalent in younger age group.
- Amongst the known diabetics a majority were on oral hypoglycaemic agents as compared to insulin therapy. Out of the known diabetic patients, 70% were on oral hypoglycaemic agents, 30% were on insulin therapy.
- 95.30% of the patient had some or other associated risk factors like hypertension, smoking or dyslipidemia. 46.8% had at least one, 40.7% had 2 risk factors and 7.8% had 3 risk factors.
- Dyslipidemia was the most common associated risk factors 65.62% followed by hypertension 59.37% ,smoking 26.56% and obesity 15.62%
- ST elevation MI was the commonest presentation (73.40%) and involvement of anterior wall was common (36.20%).
- On admission BSL (Blood Sugar Level) was not found to have a definite prognostic value in predicting outcome in diabetic patients with acute coronary syndrome.
- Impaired glycosylated haemoglobin was found to be an independent risk factor and had a defi-

nite prognostic value in predicting outcome in diabetic patients with acute coronary syndrome.

- Diabetic patient with acute coronary syndrome had LV dysfunction, cardiac rhythm abnormalities, cardiogenic shock and are likely to be readmitted, thus having worst morbidity as well as mortality.
- Those with long standing duration of diabetes had multiple micro or macrovascular complications and newly diagnosed diabetics presenting with vascular complications more often had multiple risk factors.

7. References

1. Ramchandran A. Epidemiology of type 2 diabetes and its complication in India, moses manual on diabetes mellitus, editors Das S and mosses CRA. New Delhi: IJCP Group of publications; 2007. p. 36–45.
2. King H. Aubert RE, Herman WH. Global burden of diabetes 1995-2025.-Prevalence numerical estimate and projections. Diabetic care. 1998; 21:1414–31.
3. Goyal A, Yusuf S. The burden of cardiovascular disease in the Indian subcontinent. Indian J Med Res. 2006; 124:235–44. PMid:17085827
4. Yusuf S, Hawken S, Ounpuu S, et al. Effect of potentially modifiable risk factors associated with myocardial infarction in 52 countries (the INTERHEART study): Case-Control Study. Lancet. 2004; 364:937–52. https://doi.org/10.1016/S0140-6736%2804%2917018-9
5. Ajay VS, Gupta R, Panniyammakkal J, et al. National cardiovascular disease database, delhi ministry of health and family welfare. Government of India. Geneva: World Health Organization; 2002
6. Waller BF, Palumbo PJ, Lie JT, Roberts WC. Status of coronary artery disease at necropsy in diabetes mellitus after age 30 year: Analysis of 229 diabetic patients with and without evidence of coronary heart disease and comparison to 183 control subjects. Am J Med. 1980; 69:498–506 https://doi.org/10.1016/S0149-2918%2805%2980002-5
7. Fuster V, Moreno PR, Fayad ZA, et al. Atherothrombosis and high-risk plaque: Part 1: evolving concept. J Am Cardiol. 2005; 46:937–54. https://doi.org/10.1016/j.jacc.2005.03.074 PMid:16168274
8. Malmberg K, Rydén L, Wedel H, Birkeland K, Bootsma A, Dickstein K, Efendic S, Fisher M, Hamsten A, Herlitz J, Hildebrandt P, MacLeod K, Laakso M, Torp-Pedersen C, Waldenström. Intense metabolic control by means of insulin in patients with diabetes mellitus and acute myocardial infarction (DIGAMI 2): effects on mortality and morbidity. Eur Heart J. 2005 Apr; 26(7):650–61. https://doi.org/10.1093/eurheartj/ehi199 PMid:15728645
9. Katayama T, Nakashima H, Takagi C, Honda Y, Suzuki S, Iwasaki Y, Yano K. Clinical outcomes and left ventricular function in diabetic patients with acute myocardial infarction treated by primary coronary angioplasty. Int Heart J. 2005 Jul; 46(4):607–18. https://doi.org/10.1536/ihj.46.607 PMid:16157952
10. Mayer DD, Rosenfeld A. Symptom interpretation in women with diabetes and myocardial infarction. A qualitative study. The Diabetes Educator 2006 Nov-Dec; 32(6):6 918–24.
11. Andersson DK, Svardsudd K. Long-term glycemic control relates to mortality in type II diabetes. Diabetes Care. 1995; 18:1534–43. https://doi.org/10.2337/diacare.18.12.1534
12. Klein R, Klein BE, Moss SE. The Wisconsin epidemiologic study of diabetic retinopathy. XVI. The relationship of C-peptide to the incidence and progression of diabetic retinopathy. Diabetes. 1995 Jul; 44(7):796–801. https://doi.org/10.2337/diab.44.7.796 PMid:7789648
13. Barrett-Connor E, Wingard DL. Sex differential in ischemic heart disease mortality in diabetics: A prospective population-based study. Am J Epidemiol. 1983; 118:489–96. https://doi.org/10.1093/oxfordjournals.aje.a113654 PMid:6637976
14. Wei M, Gaskill SP, Haffner SM, et al. Effects of diabetes and level of glycemia on all-cause and cardiovascular mortality. The San Antonio Heart Study. Diabetes Care. 1998; 21:1167–72. https://doi.org/10.2337/diacare.21.7.1167 PMid:9653614
15. Singer DE, Nathan DM, Anderson KM, et al. Association of HbA1c with prevalent cardiovascular disease in the original cohort of the Framingham heart study. Diabetes 1992; 41:202–8. https://doi.org/10.2337/diabetes.41.2.202 PMid:1733810
16. Hsu LF, Mak KH, Lau KW, Sim LL, Chan C, Koh TH, Chuah SC, Kam R, Ding ZP, Teo WS, Lim YL. Clinical outcomes of patients with diabetes mellitus and acute myocardial infarction treated with primary angioplasty or fibrinolysis. Heart. 2002 Sep; 88(3):260–5. https://doi.org/10.1136/heart.88.3.260 PMid:12181218 PMCid:PMC1767339
17. Nathan DM, Cleary PA, Backlund JY, Genuth SM, Lachin JM, Orchard TJ, Raskin P, Zinman B. Intensive diabetes treatment and cardiovascular disease in patients with Type 1 diabetes. N Engl J Med, 2005; 353:2643–53. https://doi.org/10.1056/NEJMoa052187 PMid:16371630 PMCid:PMC2637991

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