Original Research Article

Glycosylated hemoglobin levels and complications of acute coronary syndromes - A prospective study at tertiary care hospital

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Abstract

Background and objectives: This study was aimed to find out the role of glycosylated haemoglobin (HbA1c) levels and complications of ACS patient. **Methodology:** This hospital based prospective observational study was carried out for the period of 15 months from January 2017 to March 2018. A total of 100 patients who presented with ACS were studied. **Results:** Most of the patients were males (54%) and mean age was 62.36±9.89 years. The mean fasting blood sugar (FBS) levels were 107.64±10.60 mg/dL, post prandial blood sugar (PPBS) levels were 174.62±31.88 mg/dL. HbA1c levels were ≥6.5 percent in majority of the patients (68%) and Complications were noted in 25% of the patients. Left ventricle function (LVF) was noted in 16% and arrhythmia in 5%. Mortality was noted in 2% of the patients. Significantly higher number of patients with HbA1c levels ≥6.5 percent had complications (p=0.048). **Conclusion and interpretation:** Admission HbA1c levels are associated with in hospital adverse events, complications and outcome in ACS.
Key Word: Acute coronary syndrome; Blood sugar levels; Diabetes mellitus; Glycosylated hemoglobin;

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Received Date: 21/01/2019 Revised Date: 19/02/2019 Accepted Date: 16/03/2019
DOI: https://doi.org/10.26611/10219310

Access this article online	
Quick Response Code:	Website: www.medpulse.in
	Accessed Date: 21 March 2019

INTRODUCTION

Acute coronary syndrome (ACS) is a common emergency faced by physician during career. ACS otherwise known as heart attacks, develops when a coronary artery blockage occurs suddenly. Acute cardiac events that may lead to acute myocardial infarction (AMI) and sudden cardiac death are unpredictable.[1] acute coronary syndrome (ACS) is an umbrella term for a wide spectrum of clinical signs and symptoms suggestive of myocardial ischemia and infarction.[2]everal studies have clearly demonstrated a link between type 2 diabetes and acute coronary syndromes (ACS).[3,4] Diabetes is a majorly vascular disease with dual microvascular and macrovascular complications. Macrovascular complications start taking place long before the patient has overt diabetes.[5] High prevalence of diabetes and undiagnosed diabetes or prediabetic states are seen in patients with stable or unstable coronary artery disease (CAD).[3,7] Several studies have shown prognostic role of hyperglycemia and diabetes in patients with ACS. Hyperglycemia at admission for ACS is associated with less favorable outcome.[3,4,8-11] Though acute hyperglycemia may be due to the preexisting diabetes mellitus, it may also occur as a part of stress response to the disease state. Hemoglobin A1c (HbA1c) is less influenced by acute stress. Therefore, HbA1c levels may provide insight into the relation between chronic glucose control and patient outcomes. Thus HbA1c level is an indicator of average blood glucose concentrations over the preceding 2-3 months.[12] Moreover, a recent report found that elevated HbA1c levels are also predictive for cardiovascular disease and mortality in patients without DM.[13] Hence the present

How to cite this article: Abhijeet A Nashte, Ravindra K Shravasti, Amey S Vaidya. Glycosylated hemoglobin levels and complications of acute coronary syndromes - A prospective study at tertiary care hospital. *MedPulse International Journal of Medicine*. March 2019; 9(3): 192-195. https://www.medpulse.in/Medicine/

study was undertaken to find out the relation between HbA1c levels and complication of ACS.

AIM AND OBJECTIVES

To study Glycosylated hemoglobin levels and complications of acute coronary syndromes – a prospective study at tertiary care hospital

MATERIAL AND METHODS

Study design-The study design was a hospital based prospective observational study carried out on a total of 100 patients with ACS were selected for the study at Department of Medicine, Bharati Vidyapeeth Deemed University, Medical College and Hospital, Sangli over period of 15 months. January 2017 to March 2018 after ethical clearance from college and university committee

Inclusion criteria:

1. All patient admitted to hospital with ACS not having diabetes as past medical history.
2. criteria to diagnose ACS- a) anginal chest pain, b) typical ECG changes like ST elevation MI, NON ST elevation MI, Unstable Angina and cardiac enzymes in STEMI and NSTEMI - CPKMB and Trop – I
3. patients above the age of 18 years

Exclusion criteria:

1. Patient not willing to participate in study.
2. Patient having history of past or present diabetes.
3. angina secondary to extra-cardiac causes like anemia, thyroid disease

Investigations

- fasting Blood sugar levels
- Post-prandial blood sugar levels.
- Glycosylated haemoglobin (HbA1c)
- Cardiac enzymes – CPK MB and Troponin I

Glycosylated haemoglobin: HbA1c was calculated by high performance liquid chromatography(HPLC). Based on ADA 2018 recommended target for HbA1c, a value of ≤6.5 was considered as optimal.[82,83]

Complications and outcome: Outcome is regarded as the status of the patient at the time of discharge. It may be survival or death of the patient undergoing this study. Complications like arrhythmia, LVF were noted during the course of hospital stay.

RESULTS

Table 1: Distribution of patients according to the sex

Sex	Distribution (n=100)	
	Number	Percentage
Male	54	54.00
Female	46	46.00
Total	**100**	**100.00**

Table 2: Distribution of patients according to the age

Age group (Years)	Distribution (n=100)	
	Number	Percentage
41 to 50	13	13.00
51 to 60	32	32.00
61 to 70	37	37.00
71 to 80	14	14.00
81 to 90	4	4.00
Total	**100**	**100.00**

Table 5: Distribution of patients according to the blood sugar and HbA1c

Blood sugar levels (mg/dL)	Findings	Distribution (n=100)	
		Number	Percentage
Fasting blood sugar levels (mg/dL)	Normal (<100)	7	7.00
	Prediabetes (100 to 125)	82	82.00
	Diabetes (≥ 126)	11	11.00
	Total	**100**	**100.00**
Post prandial blood sugar levels (mg/dL)	Normal (<140)	7	7.00
	Above Normal (≥140)	93	93.00
	Total	**100**	**100.00**
HbA1c levels (%)	< 6.5	32	32.00
	≥ 6.5	68	68.00
	Total	**100**	**100.00**

Table 7: Distribution of patients according to the ECG findings

Findings	Distribution (n=100)	
	Number	Percentage
STEMI	85	85.00
NSTEMI	14	14.00
Unstable angina	1	1.00
Total	**100**	**100.00**

Table 10: Distribution of patients according to the complications

Complications	Distribution (n=100)	
	Number	Percentage
LVF	16	16.00
Arrhythmia	5	5.00
LVF with arrhythmia	4	4.00
Absent	75	75.00

Table 11: Association of complications with glycosylated hemoglobin and blood sugar levels

Blood sugar level	Findings	Complications				Total		P value
		Absent		Present				
		No.	%	No.	%	No.	%	
Random (mg/dL)	< 200	67	76.14	21	23.86	88	88.00	**0.347**
	≥200	8	66.67	4	33.33	12	12.00	
	Total	**75**	**75.00**	**25**	**25.00**	**100**	**100.00**	
Fasting (mg/dL)	< 100	7	100.00	0	0.00	7	7.00	**0.113**
	100 to 125	62	75.61	20	24.39	82	82.00	
	> 126	6	54.55	5	45.45	11	11.00	
	Total	**75**	**75.00**	**25**	**25.00**	**100**	**100.00**	
Post prandial (mg/dL)	< 140	6	85.71	1	14.29	7	7.00	**0.438**
	≥ 140	69	74.19	24	25.81	93	93.00	
	Total	**75**	**75.00**	**25**	**25.00**	**100**	**100.00**	
HbA1c (%)	< 6.5	28	87.50	4	12.50	32	32.00	**0.048**
	≥ 6.5	47	69.12	21	30.88	68	68.00	
	Total	**75**	**75.00**	**25**	**25.00**	**100**	**100.00**	

DISCUSSION

Nonmodifiable factors that influence risk for coronary artery disease include age and sex. Men have a higher risk than women thus in this study most of the patients were males (54%) and male to female ratio was 1.17:1.14 Most of the patients were (37%) aged between 61 to 70 years and 32% of the patients were aged between 51 to 60 years. The mean age was 62.36±9.89 years. Chest pain has been reported as the cardinal feature in patients with AMI. The WHO requires the presence of chest pain as one of the cornerstone feature for the diagnosis of chest pain15 and All the patients presented with chest pain radiating to left arm /radiating to back (100%). The next common complaint was breathlessness (57%) and vomiting and profuse sweating (45%). Fasting blood sugar levels were between 100 to 125 mg/dL in majority of the patients while ≥126 mg/dL were note in 11% of the patients. The mean fasting blood sugar levels were 107.64±10.60 mg/dL Post prandial blood sugar levels were noted as ≥140 mg/dL in majority of the patients. The mean post prandial blood sugar levels were 174.62±31.88 mg/dL. HbA1c levels were ≥6.5 percent in majority of the patients (68%). The mean HbA1c levels were 6.62±0.73 percent. Based on ECG, majority of the patients were diagnosed with STEMI (85%), followed by NSTEMI (14%). Complications were noted in 25% of the patients. LVF was the common complication noted in 16% of the patients and arrhythmia was noted in 5% of the patients while arrhythmia with LVF was noted in 4% of the patients Majority of the patients (98%) improved and discharged. While mortality was noted in 2% of the patients Significantly higher number of patients with HbA1c levels ≥6.5 percent developed complications (30.88% vs 12.50%; p=0.048) and elevated HbA1c level was a strong and independent predictor of severity and complication in ACS patients even in nondiabetics16

CONCLUSION

Overall, the present study showed that, elevated glycated haemoglobin at admission is associated not only with short term complications but also with adverse outcome. These findings require further validation due to the potential limitations of the study outcome. Hence further

multicentric studies involving large sample size and long term follow up may provide the predictive role of admission glycated hemoglobin.

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Source of Support: None Declared
Conflict of Interest: None Declared