

# Study of prognostic value of glycosylated haemoglobin (HbA1C) in acute coronary syndrome in Maharashtra population

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## Abstract

**Background:** Although there are many biomarkers which have prognostic value of ACS but HbA1C is most stable and reliable method is known DM and No DM patients **Method:** 92 adult patients admitted in CCU, were selected their blood examination like RBS Fasting PP., serum cholesterol, HDL, LDL, HbA1C levels were studied left ventricular ejection fraction was measured by Simpsons method using 2 dimensional echocardiography using 2 dimensional echocardiography **Results:** 30(32.6%) patients had normal level of HbA1C(>5-6) and 62(67.3%) had higher level of HbA1C (5.7 to 6.4) ECG changes were 13(14.1%) NSTEMI 17(18.4%) STEMI in normal HbA1C patients, 18(19.5%) NSTEMI 44(47.8%) in elevated HbA1C patients, 8(8.6%) had positive, heart failure 22(23.9%) had negative, heart failure in patients in normal level of HbA1C while 15(16.3%) positive heart failure, 47(51%) negative heart failure in elevated HbA1C patients. **Conclusion:** HbA1C is a stable reliable prognostic biomarker in ACS patients with or without DM.

**Key words:** Diabetic mellitus, Acute coronary syndrome, non-ST elevation myocardial infarction, ST elevation myocardial infarction, coronary cardiac unit.

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## INTRODUCTION

Acute coronary syndrome (ACS) is the leading cause of death in world wide. Although prognosis of ACS patients has been improved in the past decades, there is a lot of room decades for further improvement, as the ACS patients clearly have higher risk for a recurrent cardiovascular events compared with the corresponding general population<sup>1</sup>. Biomarkers are good for prognosis evolution and risk stratification of ACS patients. Troponins, CRP and NT-BNP are the main predictors for ACS patients.

However they still have some drawbacks as BNP levels are also found to be significantly influenced by age, fluid loading and physical exercise<sup>2</sup> and CRP is influenced by inflammation. Cardiac troponin are affected by reperfusion modalities<sup>3</sup>. Hence there is a need for more reliable biomarkers for the prognosis of ACS patients. Hyperglycemia and newly diagnosed diabetes mellitus are found in large number of ACS patients and strong predictor for the poor prognosis of those patients is HbA1C. HbA1C reflects average blood glucose concentration over previous 8-12 weeks was shown to be better predictor of prognosis following ACS than fasting and admission glucose<sup>4</sup>. Hence attempt was made to study the prognostics values of HbA1C in ACS patients.

## MATERIAL AND METHODS

92 adult patients admitted CCU with acute coronary syndrome PIMS hospital Islampur- 415409 (Maharashtra) were selected for study

**Inclusive criteria-** Patients having Diabetes Mellitus, Hypertension hyperglycemia, anginal pain were included in the study.

**Exclusion criteria** – The patients below 18 year, patients with congenital anomalies of heart, juvenile Diabetics, patients on anti psychiatric drugs. Immune compromised patients were excluded from the study.

**Method-** Habits and family history and BMI each patients was recorded. The blood examination was carried out to rule out HbA1C, fasting, total serum cholesterol, LDL, HDL fasting PP, CKD on maintenance dialysis and uremia CLD sepsis. The patients were classified into two groups as per the level of HbA1C level Group a- than 5.6 (30 patients) and Group B-5.7 to 6.4 (62 patients) left ventricular ejection fraction was measured by simpson’s method using 2-dimensional echo cardiography. The duration of study was June 2016 to Nov 2019.

**Statistical analysis-** The normal abnormal HbA1C, ECG changes of Acute cardiac syndrome in relation HbA1C, cardiac failure in relation to HbA1C were studied with percentage and member patients compared with mean value (SD±) in SPSS software of 2017. The ratio of male and female was 2:1

**OBSERVATION AND RESULTS**

Table-1 –Study of total numbers of patients with various level of HbA1C- 30(32.6%) patients had normal level of (>5.6) and 62(67.3%) patients had higher (abnormal level) of HbA1C

**Table 1:** (No of patients 92)With their HbA<sub>1</sub>C levels

Particulars	No of Patients	Percentage
Normal HbA <sub>1</sub> C(>5.6)	30	32.6
Elevated HbA <sub>1</sub> C (5.7 to 6.4)	62	67.3

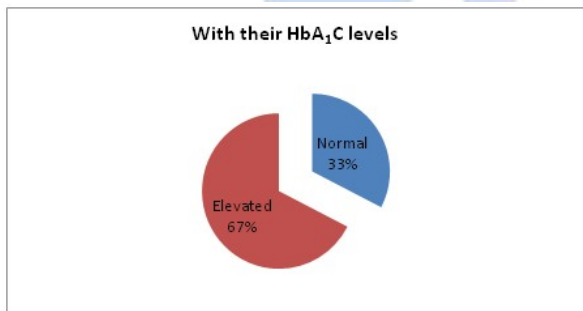


Table-2 –Study of ECG changes in ACS patients in relation to HbA1C- 13 (14.1%) had NSTEMI and 17(18.4%) observed in patients with normal HbA1C while 18(19.5%) NSTEMI and 44(47.8%) STEMI patients were observed in higher level of HbA1C heart failure.

**Table 2:** (No of patients 92)Study of ECG changes patients with acute coronary syndrome in relation to HbA<sub>1</sub>C

Particular	NSTEMI	STEMI	Total
Normal HbA <sub>1</sub> C	13(14.1%)	17(18.4%)	30
Elevated HbA <sub>1</sub> C(5.7 to 6.4)	18(19.5%)	44(47.8%)	62

(NSTEMI= Non Elevation Myocardial Infarction)  
STEMI= (ST Elevation myocardial infarction)

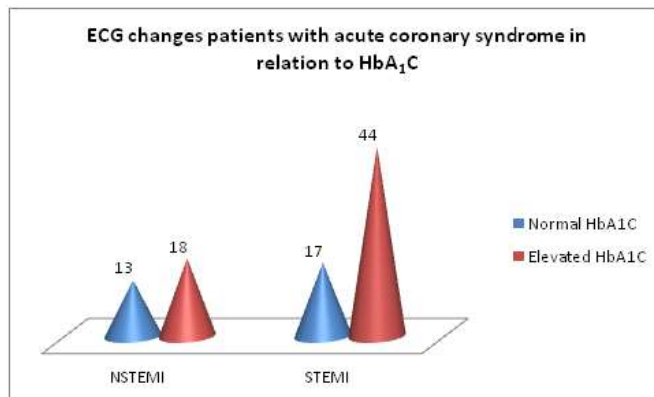
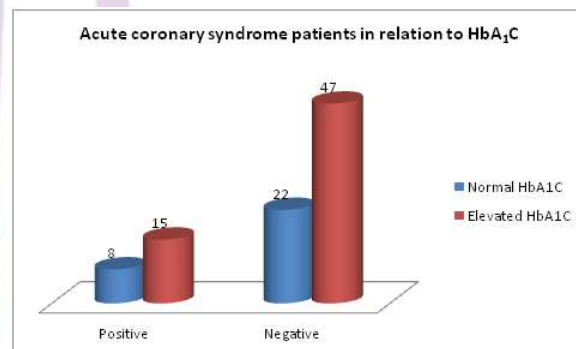


Table-3- study of heart failure in ACS patients in relation to HbA1C – 8(8.6%) positive heart failure observed 22(23.9%) Negative heart failure in normal HbA1C patients, 15(16.3%) positive heart failure 47(51%) 15(16.3%) positive heart failure observed in higher level of HbA1C patients.

**Table 3:** (No of patients 92) Study of in acute coronary syndrome patients in relation to HbA<sub>1</sub>C

Particular	Positive	Negative	Total
Normal HbA <sub>1</sub> C	8(8.6%)	22(23.9)	30
Elevated HbA <sub>1</sub> C(5.7 to 6.4)	15(16.3%)	47(51%)	62



**DISCUSSION**

In the present study of prognostic Glycosylated Hemoglobin (HbA1C) in ACS in Maharashtra population. In the present study out of 92, 30 (32.6%) had normal >5.6 HbA1C while 62 (67.3%) patients had higher level of HbA1C (Table-1) In the study of ECG changes in ACS patients in relation to HbA1C- 13 (14.1%) had NSTEMI and 17(18.4%) observed in patients with normal HbA1C while 18(19.5%) NSTEMI and 44(47.8%) STEMI patients were observed in higher level of HbA1C (Table-2). In the study of heart failure in ACS patients in relation to HbA1C – 8(8.6%) positive heart failure observed 22(23.9%) Negative heart failure in normal HbA1C patients 15(16.3%) positive heart failure 47(51%) 15(16.3%) positive heart failure observed in higher level of HbA1C (Table-3). These findings were more or less in

the agreement with previous studies.<sup>5,6,7</sup> HbA1C was first isolated by Husiman *et al* in 1958, as a glycoprotein<sup>8</sup>. In the case of hemoglobin the glycation occurs by the non-enzymatic reaction between the glucose and the N-terminal end of the B chain, which forms Schiff base. During the re-arrangement Schiff base is converted into Amador products, which is best known as HbA1C. it was also reported that for ACS patients with DM history or without DM had higher HbA1C had an positive relationship with increased short-term mortality.<sup>9</sup> It was also noted that hyperglycemia, Could be due to stress is also associated with impaired micro vascular function and decrease coronary flow velocity even induce micro vascular obstruction in ACS Patients No reflow after reperfusion therapy due to severe hyperglycemia<sup>10</sup>. It was also experimented that there is a biological mechanism that hyperglycemia inhibits cardio stem cells from cardiac repair and angiogenesis in streptozotocin induced diabetic mice undergoing AMI surgery<sup>11</sup>. This might account for the worst prognosis for ACS patients. Moreover hyperglycemic periods play a major role in the activation of oxidative stress and over production of mitochondrial superoxide, which trigger various metabolic pathways of glucose-mediated vascular damage. Elevated HbA1C level is likely to resist of long term insulin resistance, metabolic disturbance associated with dyslipidemia hyper coagulability and inflammation<sup>12</sup>. This ultimately results into ACS.

### SUMMARY AND CONCLUSION

The present study of prognostic value of HbA1C in ACS quite helpful to physician cardiologist because elevated HbA1C is predictor of ACS with or without DM. HbA1C is a stable indicator of long term glucose control and insulin resistance, Which should be meticulously monitored by people at high risk of ACS. But this study demands, further patho- physiological, hematological, hormonal, and genetic because exact mechanism of correlation of HbA1C with ACS is still unclear.

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