ORIGINAL RESEARCH PAPER

General Medicine

A STUDY OF HBA1C IN NON DIABETIC PATIENTS WITH ACUTE CORONARY SYNDROME:PROGNOSTIC SIGNIFICANCE

KEY WORDS: Non Diabetic ;Acute Coronary Syndrome; Hba1c

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ABSTRACT

BACKGROUND: Diabetes plays a major role in Coronary artery disease and complications.
There is an exponential elevation of cardiovascular risk and complications with glucose status which also extends into the pre diabetic state.HbA1c levels can be independent predictor of cardiovascular risks.
AIM: To assess the prognostic impact of HbA1c in non-diabetic with ACS.
MATERIALS and METHODS:A cross sectional study was done on 172 non diabetics with ACS. HbA1c at admission was measured and relation to Major Adverse Cardiovascular Events in the form of arrhythmias, cardiogenic shock or cardiac failure was assessed.
OBSERVATIONS: In our study 71.5% were males and 28.5% females. Out of 172 patients, 76 had HbA1c level above 5.7 % (high risk group), of which 55.6%(n=42) had cardio-vascular complications. In the rest of the 96 patients with HbA1c less than 5.75% (low risk group), it was 32.29% (n=31)
CONCLUSION: This study demonstrated non-diabetics with ACS are associated with poorer outcomes when they have pre-diabetic levels of HbA1c. Hence baseline HbA1c should be considered in predicting the complications and prognosis of the disease.

INTRODUCTION

In 2000, there were an estimated 29.8 million people with CHD in India out of a total estimated population of 1.03 billion, nearly 3% overall prevalence, 3–4% in rural areas and 8–10% in urban areas in 2003[1-4]. In 2008, it increased to6 %(rural) and 12% (urban) 5..Glucose intolerance is associated with a 1.5-fold increase in the risk of developing cardiovascular disease[6]. Of the Micro and macrovascular complications in diabetes, the later can develop even before the full blown disease manifests.[7-8]. Increased blood glucose is an independent risk factor along with platelet aggregation and activation leading to thrombus formation .9-10Elevated plasma fibrinogen, reduced fibrinolytic activity , reduced tissue plasminogen activator activity due to increased plasma concentration of and enhanced binding to its inhibitor, (plasminogen activator inhibitor) seen in association with hyperglycemic states[11-13]. Glycated proteins and advanced glycation end products accelerates the atherosclerosis by worsening endothelial dysfunction.[14]. There is a significant prevalence (40%) of impaired glucose metabolism in non-diabetic ACS on admission.[15-16].There has been various studies with increased mortality independent of diabetic status17.HbA1c as an independent predictor of cardiovascular risk has been established from various studies[10-13]. HbA1c is a simple, reliable and a long term measure of glycemic status. Studies done on those ACS patients undergoing coronary revascularization was shown to have increased association with high HbA1c levels[7,8,9,18,19]. Very few studies have been done in context of exposing the role in cardiovascular prognosis.

AIMS AND OBJECTIVES

1. To study and assess the prognostic impact of admission HbA1c values in patients without diabetes mellitus who were admitted with ACS.
2. To study the prevalence of ACS in pre diabetics.

MATERIAL AND METHODS

Type of study: Cross sectional observational study.
Duration of Study: July 2016 to June 2017
Place of Study: SSMC and Sanjay Gandhi Memorial Hospital, Rewa.

Sample Size: 172 Non diabetic patients admitted to medicine ICCU with ACS.

INCLUSION CRITERIA

1. Non diabetic presenting with acute coronary syndrome
2. Age group 35-85 years.

EXLCUSION CRITERIA

1. Diabetes mellitus
2. Chronic kidney disease
3. Hemoglobinopathies
4. Sepsis
5. HbA1c >6.5%
6. Anemia
7. Not giving consent for the study.

RESULTS

Table 1: Base line characteristics of participants

Variables	Frequency (n=172)	Percent
Male	123	71.5%
Female	49	28.5%
BMI>25	37	21.5%
BMI<25	135	78.5%
Hypertension		
Yes	39	22.7%
No	133	77.3%
Tobacco Use		
Yes	91	52.9%
No	81	47.1%
HbA1c		
<5.69%	96	55.8%
>5.7%	76	44.2%

71.5% were males (mean age=57.57) and 28.5% females (mean age= 62.24). 22.7% (n=39) hypertensive and 21.5 %(n=37) had BMI >25 .Majority of them were tobacco smokers and tobacco chewers (52.9%.High normal HbA1c values are seen in 44.2%. 75.6% (n=130) had STEMI, 22.7% (n=39) had NSTEMI and 3% had unstable angina.

Figure 1: ECG findings of study participants
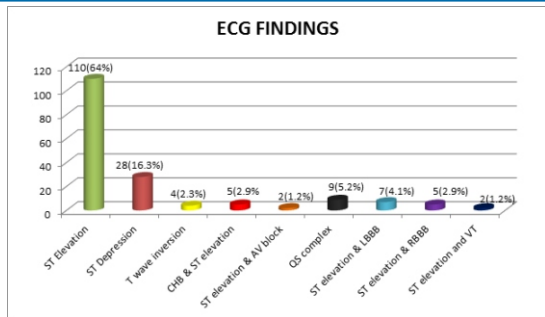
Maximum findings was of ST elevation (64.0%) followed by ST depression (16.3%) and least with AV block &VT (1.2%)

Table 2: Comparison of Cardio – vascular complications with HbA1C

HbA1C	Major adverse Cardiovascular events								
	No Complications	LVF	Arrhythmia	Death	Reinfarct	Valvular Heart Damage	LVF & Arrhythmia	Shock	Total
5.7% and above	34 (44%)	21 (27.63%)	11 (14.47%)	1 (1.31%)	2 (2.6%)	4 (5.26%)	1 (1.31%)	2 (2.6%)	76
5.69% and below	65 (67%)	24 (25%)	0	0	3 (3.12%)	2 (2%)	2 (2%)	0	96

High proportion of cardio vascular complications (55.26%)were found , when HbA1C >5.7% and lower (32.29%) when HbA1 <5.7%. (p<0.001) .Majority of them was left ventricular failure (27.63%) followed by arrhythmias (14.47%) Death was found in 1.31%in the high HbA1c group.

Table: 3 Association of ejection fraction with HbA1c

Ejection Fraction		
HbA1C Values	≤40%	≥41%
>5.7%(n=76)	39 (51.32%)	37 (48.6%)
<5.69%(n=96)	27 (28%)	69 (71.8%)

51.32% had an ejection fraction lower than 40 % in HbA1C levels > 5.7 with significant association (p =0.002)

Table: 4 Comparison of Cardiovascular complications with Ejection Fraction

Cardio-Vascular Complication	Ejection Fraction	
	≤40%(n=66)	≥41%(n=106)
Nil	20 (30%)	79 (74.5%)
LVF	32 (48%)	13 (12.26%)
Arrhythmia	5 (7.5%)	6 (5.66%)
Death	0	1 (0.9%)
Reinfarct	2 (3%)	3 (2.83%)
Valvular Damage	5 (7.5%)	1 (0.9%)
LVF and Arrhythmia	2 (3%)	1 (0.9%)
Shock	0	2 (1.88%)

High proportion of total cardiovascular complications (69.69%)found in participants with ejection fraction <40% with significant association (p<0.001)

Table 5: Comparison of HbA1c values with 2D ECHO findings

HbA1C	2 D aECHO		
	Normal	RWMA	RWMA and Valvular abnormality
>5.7%(n=76)	9(11.8%)	53(69.7%)	14(18.4%)
<5.69%(n=96)	29(30.2%)	64(66.6%)	3(3.125%)

68 % had Regional Wall Motion Abnormality and9.9% had RWMA with acute valvular abnormalities, with higher proportions whenHbA1C > 5.7. (p =0.001)

Table 6: Comparison of Diagnosis with HbA1c Values

HbA1C	Diagnosis		
	STEMI	NSTEMI	Unstable Angina
>5.7%(n=76)	64(84.2%)	9(11.8%)	3(3.94%)
<5.69%(n=96)	66(68.7%)	30(31.2%)	0

Frequency distribution of acute coronary syndrome in the 2 groups.

DISCUSSION

Several studies show progressive relation between glucose concentrations and cardiovascular risks which extends into the pre diabetic states[20-21].Caiet al[22](2014) showed **a strong association of HbA1c with** CAD severity, after adjusting other risk factors. In contrast, Ertem A G et al.[23] showed no significant relationship (p=0.299).Our study recorded a prevalence of pre diabetic ACS of 44%.Similar studies by Dubey et al[24](2016)and Singh et al[25] (2017) showed 18.2% and 64% respectively.

Our endpoints, major adverse cardiovascular events (MACE) was found to have significant association with pre diabetics (p<0.001).Similar studies by Vinita Elizabeth Mani and John[26](2011) and Singh et[25] al (2017) showed increased amount of arrhythmias when HbA1c>5.7%.

Our study observed that the percentage of RWMA with or without valve damage and significantly depressed cardiac function (51.32%) in HbA1c>5.7%. Razzaq et al.[27] (2013) demonstrated a linear decrease in EF with rising HbA1c levels in unstable angina (P = 0.0043)

Iribarren C et al [28](2001) showed that each 1% increase in HbA1c was associated with an 8% increased relative risk of heart failure.

We recorded a mortality rate of 1.31% in high risk group and none in low risk group .Granger et al.[29] (2003) reported in-hospital mortality of 4.6% for the whole ACS sample compared to a total mortality of 0.6% in our study.

According to Corpus RA et al[30](2003) , Timmer JR et al [31] (2006) , although crude mortality was higher with elevated HbA1c following adjustment for many cardiovascular risk factors, HbA1c values failed to predict in-hospital mortality.Chowdhury TA et al[32] (1998), Rasoul S et al[33] (2007) and Cicek G et al34(2011) suggested that HbA1c level was also a predictor of both in-hospital and long-term mortality.

CONCLUSION

We observed that there was a high prevalence of acute coronary syndrome in non-diabetic individuals. The pre diabetic patients also experienced an increased number of adverse cardiovascular complications including arrhythmias, re infarction, left ventricular failure and death with significant LV systolic dysfunction compared to non diabetics. We conclude that high normal HbA1c values can distinctly predict MACE in non-diabetics with ACS during hospital stay. Hence admission HbA1c levels can be a valuable tool to foresee the prognosis of Non diabetics with ACS.

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