

Original Research

Correlation between BMI, Hba1c and fasting lipid profile in patients presenting with acute coronary syndrome and their relationship with CVD risk

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ABSTRACT

Background: Coronary artery disease is a major cause of death as well as an economic burden to both developed and developing countries. The present study was conducted to study correlation between BMI, Hba1c and fasting lipid profile in patients presenting with acute coronary syndrome and their relationship with CVD Risk. **Materials & Methods:** 58 diabetics of both genders on treatment with either insulin or oral drugs or both, presenting with acute coronary syndrome were investigated with ECG, 2D-ECHO, glycosylated haemoglobin and fasting lipid profile. Diagnosis of ACS was made on the basis of clinical features, ECG and 2D-ECHO. **Results:** There were 38 males and 20 females, ECG findings showed STEMI in 26, NSTEMI in 14 and USA in 18 cases. CAG showed SVD in 13, DVD in 28 and TVD in 17 cases. Alcohol history was seen in 22, hypertension in 40, smoking in 24. HbA1C level 6.5- 8.4% in CAG with single vessel and multiple vessels was seen among 10 and 12 and >8.5% in 6 and 30 subjects respectively. SVD and multiple vessels had HDL <40 seen in 4 and 36, >40 in 12 and 6. LDL <100 was seen in 5 and 8 and >100 in 11 and 34 subjects. The difference was significant (P< 0.05). **Conclusion:** There is strong correlation between HbA1c and dyslipidaemia, with severity of coronary artery disease. HbA1c, total cholesterol, LDL cholesterol are directly proportional and HDL cholesterol is inversely proportional to the severity of coronary artery disease.

Key words: Coronary artery disease, Dyslipidaemia, Diabetes

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INTRODUCTION

Coronary artery disease (CAD) is a major cause of death as well as an economic burden to both developed and developing countries.¹ The prevalence of CAD in urban areas of India is between 2.5%-12.6% and in rural areas, it is between 1.4%-4.6% and about 0.2% to 24% of CAD patients are having Diabetes Mellitus (DM). Among several risk factors for coronary artery disease, the prevalence of high total cholesterol/high density lipoprotein ratio is around 45.6% among urban Indian population.² The term acute coronary syndrome (ACS) refers to any

group of clinical symptoms compatible with myocardial ischemia and covers the spectrum of clinical conditions ranging from unstable angina, non-ST segment elevated myocardial infarction (NSTEMI) and ST segment elevated MI (STEMI).³

Diabetes mellitus (DM) is considered one of the most potent risk factors for cardiovascular diseases. The excess risk for cardiovascular disease is two to eight folds higher in patients with diabetes mellitus compared to non-diabetics of similar age, sex and ethnicity. High normal fasting blood glucose plus increased hemoglobin A1c (HbA1c) levels in non-

diabetics considered as potent risk factors for cardiovascular events.⁴ Glycated hemoglobin values reflect two to three months average endogenous exposure to glucose including postprandial spikes in blood glucose level and have low intra-individual variability particularly in non-diabetic patients. New clinical practice recommendation from the American Diabetes Association (ADA) advocates the use of HbA1c in diagnosis of diabetes mellitus largely on the basis of the established association between Glycated hemoglobin and microvascular disease.⁵ The present study was conducted to study correlation between HbA1c & total cholesterol, low density lipoprotein (LDL), high density lipoprotein (HDL) in diabetic patients presenting with acute coronary syndrome and also their correlation with severity of ACS independently.

MATERIALS & METHODS

The present study comprised of 58 diabetics of both genders on treatment with either insulin or oral drugs

or both, presenting with acute coronary syndrome. All were taken into the study, once they gave their written consent. Exclusion criteria were patient already on hypolipidemic drugs, old cases of coronary artery disease and newly diagnosed cases of diabetes mellitus.

Data such as name, age, gender etc. was recorded. Recording of past history, personal history, family history was done. General and systemic examination was done. All patient were investigated with ECG, 2D-ECHO, glycosylated haemoglobin (HbA1c), fasting lipid profile, liver function tests (LFT), Kidney function tests (RFT), complete blood count. Diagnosis of ACS was made on the basis of clinical features, ECG and 2D-ECHO. All these patients undergone coronary angiography to find presence of whether single-vessel or multi-vessel disease. Results were compiled and assessed using chi- square test. P value less than 0.05 was considered significant.

RESULTS

Table I Distribution of patients

Parameters	Variables	Number	P value
Gender	Male	38	0.01
	Female	20	
ECG findings	STEMI	26	0.05
	NSTEMI	14	
	USA	18	
CAG	SVD	13	0.02
	DVD	28	
	TVD	17	
Alcohol	Yes	22	0.04
	No	36	
Hypertension	Yes	40	0.01
	No	18	
Smoking	Yes	24	0.05
	No	34	

Table I shows that there were 38 males and 20 females, ECG findings showed STEMI in 26, NSTEMI in 14 and USA in 18 cases. CAG showed SVD in 13, DVD in 28 and TVD in 17 cases. Alcohol history was seen in 22, hypertension in 40, smoking in 24. The difference was significant ($P < 0.05$).

Table II Comparison of HbA1c with respect to CAG findings

HbA1C	CAG		P value
	Single vessel	Multiple vessel	
6.5- 8.4	10	12	0.01
>8.5	6	30	

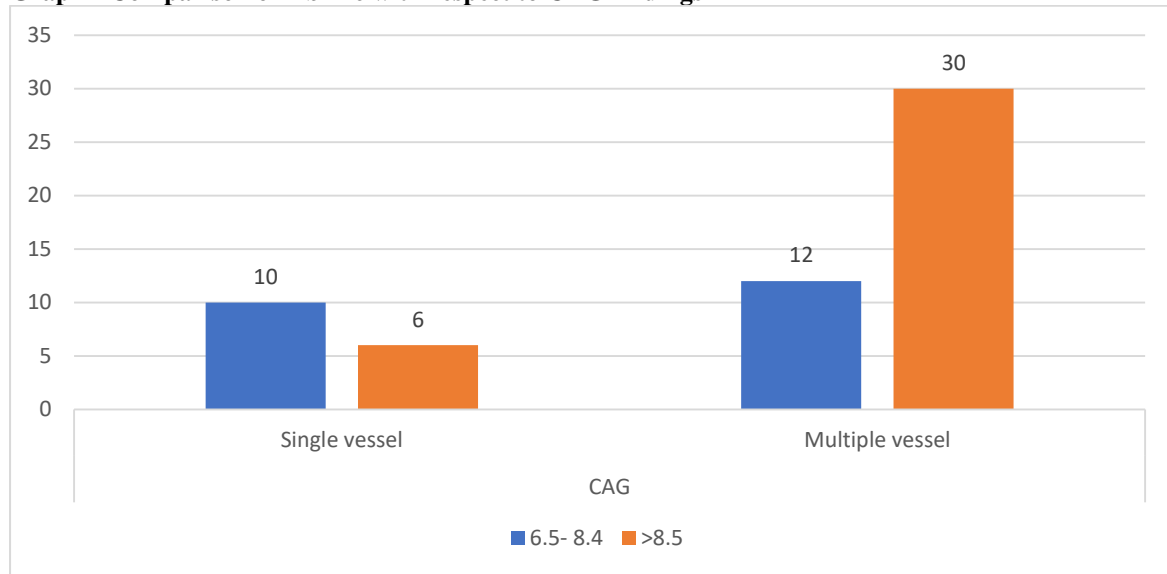
Table II, graph I shows that HbA1C level 6.5- 8.4% in CAG with single vessel and multiple vessels was seen among 10 and 12 and >8.5% in 6 and 30 subjects respectively. The difference was significant ($P < 0.05$).

Table III Assessment of parameters and CAG

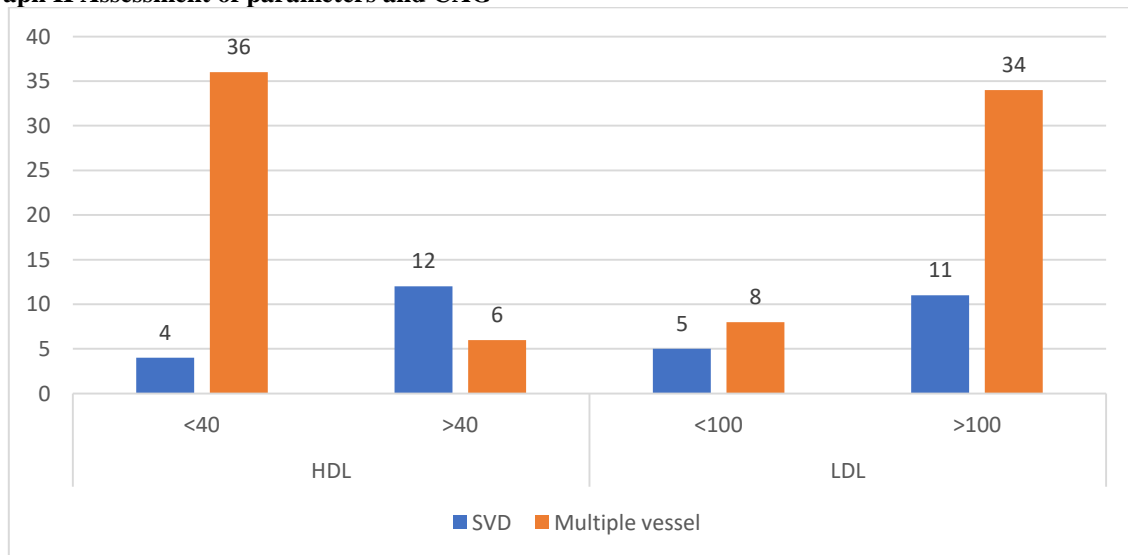
Parameters	Variables	SVD	Multiple vessel	P value
HDL	<40	4	36	0.01
	>40	12	6	
LDL	<100	5	8	0.01
	>100	11	34	

Table III, graph II shows that SVD and multiple vessels had HDL <40 seen in 4 and 36, >40 in 12 and 6. LDL <100 was seen in 5 and 8 and >100 in 11 and 34 subjects. The difference was significant ($P < 0.05$).

Graph I Comparison of HbA1c with respect to CAG findings



Graph II Assessment of parameters and CAG



DISCUSSION

Diabetes mellitus (DM) is considered one of the most potent risk factors for cardiovascular diseases. The excess risk for cardiovascular disease is two to eight folds higher in patients with diabetes mellitus compared to non-diabetics of similar age, sex and ethnicity.⁶ High normal fasting blood glucose plus increased hemoglobin A1c (HbA1c) levels in non-diabetics considered as potent risk factors for cardiovascular events. Glycated hemoglobin values reflect two to three months average endogenous exposure to glucose including postprandial spikes in blood glucose level and have low intra-individual variability particularly in non-diabetic patients.⁷ New clinical practice recommendation from the American Diabetes Association (ADA) advocates the use of HbA1c in diagnosis of diabetes mellitus largely on the basis of the established association between Glycated hemoglobin and microvascular disease.⁸ Levels of

HbA1c less than 7% deemed appropriate for reducing risk of vascular complications. Predictive value of HbA1c for coronary artery disease (CAD) severity and cardiovascular mortality in non- diabetics had been widely studied since 2004.⁹ Many previous trials found that elevated HbA1c levels are correlated with CAD severity indicating it as a marker of extensive coronary arterial disease. In contrast, other studies found no relationship between HbA1c levels and the severity of CAD in nondiabetics with acute coronary syndrome.¹⁰ The present study was conducted to study correlation between HbA1c & total cholesterol, low density lipoprotein (LDL), high density lipoprotein (HDL) in diabetic patients presenting with acute coronary syndrome and also their correlation with severity of ACS independently.

We found that there were 38 males and 20 females, ECG findings showed STEMI in 26, NSTEMI in 14 and USA in 18 cases. CAG showed SVD in 13, DVD

in 28 and TVD in 17 cases. Alcohol history was seen in 22, hypertension in 40, smoking in 24. Biomy et al¹¹ aimed to assess the relationship between HbA1c level and coronary artery disease (CAD) among non-diabetic patients. One hundred patients with acute coronary syndrome (ACS) who referred to coronary angiography were included. According to American Diabetes Association (ADA7) patients were classified into high-risk group (HbA1c 5.7 – 6.4%) or low risk group (HbA1c <5.7%). The severity of CAD was assessed by Gensini score which allocates a numerical value for the degree of coronary stenosis and a multiplication factor that depends on lesion location. The level of HbA1c was positively correlated with Gensini score ($r=0.35$, $P<0.05$). However HbA1c has no significant correlation with either RWMSI ($r=-0.09$, $p>0.05$) or LVEF ($r=-0.04$, $p>0.05$).

We found that HbA1c level 6.5- 8.4% in CAG with single vessel and multiple vessels was seen among 10 and 12 and >8.5% in 6 and 30 subjects respectively. SVD and multiple vessels had HDL <40 seen in 4 and 36, >40 in 12 and 6. LDL <100 was seen in 5 and 8 and >100 in 11 and 34 subjects. Baligar et al¹² in their study blood samples of 50 known diabetic patients presented to emergency with ACS were sent for HbA1c & lipid profile estimation. All patients underwent coronary angiography. Obtained results were statistically analysed & correlated. Statistically significant direct co-relationship was found between HbA1c, LDL, Total cholesterol, ACS severity (SVD/MVD) & inverse co-relationship with HDL.

Bouzidi et al¹³ in their study on lipid profile variables and prediction of the severity of coronary artery disease in Tunisian type 2 diabetic patients found that elevated plasma LDL-c and triacylglycerol, and reduced HDL-cholesterol contribute to accelerate atherogenesis in T2DM.

CONCLUSION

Authors found that there is strong correlation between HbA1c and dyslipidaemia, with severity of coronary artery disease. HbA1c, total cholesterol, LDL cholesterol are directly proportional and HDL cholesterol is inversely proportional to the severity of coronary artery disease.

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