Original Research Article

Association between Serum Lipid Levels and Glycated Haemoglobin in Acute Myocardial Infarction

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ABSTRACT

Introduction: Patients who were hospitalized with acute MI 30% of them was having type 2 diabetes. It was also found that a higher morbidity and mortality was observed during acute phase of MI and even in the post infarction period among patients who had uncontrolled diabetes. Glycated Haemoglobin or HbA1c and Serum Lipid levels which are considered as surrogate markers for diabetes mellitus and dyslipidemia may be the main contributory factors for these complications.
Aim: The main objective of the study to find out the association between serum lipid levels and HbA1c and match with the existing findings in this regards.
Methods: This was an observational prospective real world study done in 120 subjects who had admitted in hospital for having acute MI with or without diabetes. After admission to the hospital a detailed patient's history along with demographic details was taken and serological test to determine serum lipids, HbA1c, cardiac enzymes, was performed along with ECG in all patients. Patients were hereafter grouped in by HbA1c≥7 and HbA1c<7. Statistical analysis was performed by using statistical software.
Results: 62% patients were having poor glycemic control. A direct association or correlation was recognised in between HbA1c and serum lipid levels which include low density lipoproteins levels, total cholesterol, and triglycerides level and also observed indirect correlation with high density lipoproteins levels.
Conclusion: In monitoring long-term glycaemic control, HbA1c not only play a primary role primary role also provide valuable supplementary information regarding extent of circulating lipids.

Keywords: Glycated hemoglobin, Serum lipids, Acute Coronary Syndrome, hospitalization.

INTRODUCTION

Type 2 diabetes mellitus is characterised as complex condition of insulin resistance in peripheral tissue and deficiency in insulin secretion from impaired pancreatic β cell. [1] In today's era's diabetes was considered as one of the common metabolic disorder which affecting quality of life. [2] As compared with persons without diabetes, in people with type 2 diabetes there is a higher risk of cardiovascular disease more than twofold increased risk for cardiovascular death. [3] Among adults with type 2 diabetes mellitus elevated serum lipid levels was considered as risk factor which affecting the most for coronary artery disease with a four to six fold greater cardiovascular mortality than in the general population who were not having diameters mellitus. [4] Patients who were hospitalized with acute MI 30% of them were having type 2 diabetes. [5,6] It was also

found that a higher morbidity and mortality was observed during acute phase of MI and even in the post infarction period among patients who had uncontrolled diabetes. [7,8] Glycated Haemoglobin or

HbA1c and Serum Lipid levels which are considered as surrogate markers for diabetes mellitus and dyslipidemia may be the main contributory factors for these complications. [9,10] Due to chronic uncontrolled hyperglycemia higher prevalence of cardiovascular disease in type 2 diabetes were observed as dyslipidemia, hyperglycemia and coronary artery disease relate well with each other in type 2 diabetes. [11,12] At the time of an AMI only at plasma glucose levels due to stress hyperglycaemia, cannot be used to predict the prognosis. Related to glycemic control in cases of AMI diabetes status and complications can indicate by glycosylated haemoglobin (HbA1c). [13]

The main objective of the study to find out the association between serum lipid levels and HbA1c and match with the existing findings in this regards.

METHODS

This was an observational prospective real world study done in 120 subjects who had admitted in a tertiary care teaching hospital for having acute MI including both ST elevation (STEMI) and non ST elevation (NSTEMI) with or without diabetes. The main criteria for which patients were excluded includes Patient with known thyroid disorder, hemoglobinopathy, liver or renal disorders or malignancy, IHD or any history of stroke, patients admitted after more than 48 hours after the first symptoms of MI occur and patients who were refused to participate. Any patients who were already on any lipid lowering drugs were also excluded from the study. After admission to the hospital a detailed patient's history along with demographic details was taken and serological test to determine serum lipids, HbA1c, cardiac enzymes, was performed along with ECG in all patients. Patients were hereafter grouped

in by HbA1c≥7 and HbA1c<7. National Cholesterol Education Programme (NCEP) Adult Treatment Panel III (ATP III) guideline were followed for reference serum lipid level. As per which the normal reference level of serum was considered as Total Cholesterol (TC)> 200 mg/dl, Low Density Lipoprotein (LDL) > 100 mg, Tri Glyceride (TG) > 150 mg/dl and High Density Lipoprotein (HDL)< 40 mg/dl. If one or more than one above mention were present in patients' blood it was considered that patients were having Dyslipidemia. Statistical analysis of the experimental data was performed with SPSS for Windows (Version 16.0, SPSS Inc., Chicago, IL). Data that was normally distributed are presented as the mean standard deviation and categorical variables are expressed as percentages. p value of less than 0.05 was taken as level of significance.

RESULTS

Demographic details of 120 patients who were divided in the basis of HbA1c were mentioned in table 1. Group 2 having 54% male and group 1 were having 60% male patients. Average age and weight was almost comparable in both the groups.

Table 1: demographic characteristic

Characteristic	Group 1 HbA1c < 7% (N=48)	Group 2 HbA1c ≥ 7%(N=72)	p-value
Age (Years)	62±8	64±6	0.23
Male (%)	29 (60%)	39 (54%)	0.31
Weight (Kg)	86±12	87±16	0.29
Systolic Blood Prsure (SBP)(mmHg)	193±21	205±28	0.17
Dystolic Blood Prsure (DBP)(mmHg)	122±18	126±23	0.34
Blood Urea (mg/dl)	54±8	52±12	0.26
Serum Createnin (mg/dl)	1.1±.5	1.2±.5	0.16
AST (SGOT)(U/L)	36±8	38±6	0.42
ALT (SGPT)(U/L)	42±7	43±6	0.49
HbA1c (%)	6.7±0.2	8.5±0.2	0.06

Between the patients with good and poor glycemic control, there were no difference observed with respect to locality, religion gender distribution and duration of hospital stay. Here was no significant correlation between diastolic and systolic blood pressure with good or poor glycemic control.

Table 2: Table showing Lipid profile parameters in patients with HbA1c < 7% and HbA1c ≥ 7%

Parameters	HbA1c < 7% (N=48)	HbA1c ≥ 7% (N=72)	p-value
TC (mg/dl)	185.03± 16.26	208.69± 17.28	<0.05
TG (mg/dl)	146.86±15.11	172.42±21.52	<0.05
HDL(mg/dl)	41.29± 3.83	35.63±3.06	<0.05
LDL (mg/dl)	112.81±19.89	138.20±18.48	<0.05
TC/HDL	4.31±0.71	5.78± 0.72	<0.05
LDL/HDL	2.66± 0.68	3.77±0.66	<0.05

On comparing the various lipid parameters in groups with HbA1C ≥7 and HbA1C<7 groups, it was found in our study that out of 48 patients with HbA1c <7%, 39 (81%) had TC ≤ 200 and 9(19%) had TC > 200 mg/dl.

It was seen from our study that there was a direct significant correlation between HbA1C and TG, TC, TC/HDL, LDL/HDL, LDL and there was inverse correlation between HbA1C and HDL. (Table 2)

DISCUSSION

It has been well established that elevated glycemic level is a significant cardiovascular risk with and without a prior history of myocardial infarction. [14] Even after adjusting for hypertension, age, smoking and left ventricular hypertrophy, diabetes remained an independent risk factor. [15] The relative risk for any cardiovascular event was 1.18 with every HbA1c increase of 1% a meta-analysis of 13 prospective cohort studies. [16] Partly or mainly dependent on sustained chronic hyperglycaemia and diabetic dyslipidemia Interventional studies have established that cardiovascular complications. [17] In several studies it had been found that females have been found to have higher levels of total cholesterol, triglyceride and HDL-C which is in agreement with many studies. [18-20] HbA1c significantly higher in diabetic patients with silent myocardial ischemia as confirmed by a recent study which included 120 T2DM. [21]

In the current study, as shown in the results above, as compared to patients with HbA1c < 7.0%, patients with HbA1c ≥ 7% had a significant increase in TG, LDL, TC, TC/HDL and LDL/HDL ratio and a decrease in their HDL levels. The Diabetes Complications and Control Trial (DCCT) established HbA1c levels <7% appropriate for reducing the risk of vascular complications and also as the gold standard of glycaemic control. Thus, as proven in several trial, [22,23] this study done among poor patients who were not able to carry out several costly serological test to evaluate risk or status of AMI, HbA1C can be used as a predictor of cardiovascular risk in diabetics.

CONCLUSION

In monitoring long-term glycaemic control, HbA1c not only play a primary role primary role also provide valuable supplementary information regarding extent of circulating lipids. Significant correlation of level of HbA1c with parameters of lipid profile suggests utility of HbA1c as a marker of dyslipidemia in addition to chronic hyperglycemia and hence should be analysed accordingly.

Conflicts of Interest: The authors have no conflicts of interest to declare.

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