Assessment of correlation of fasting blood glucose, Hb1Ac and serum Lipid Level in Type II Diabetes patients: A clinical study

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ABSTRACT--_Diabetes is one of the debilitating pathology affecting a significant proportion of world's population. The pathogenesis of dyslipidemia in diabetic patients is multifactorial. Major pathway is due to reduction in lipoprotein lipase activity because of insulin deficiency. Hence; the present study was undertaken for assessing correlation between fasting blood glucose, Hb1Ac and serum Lipid Level in Type II Diabetes patients. A total of 200 patients with confirmed diagnosis of type II diabetes mellitus were enrolled in the present study. Complete demographic and clinical data of all the patients was obtained. Patients were called in the morning time and fasting blood samples were obtained and were sent to central laboratory for assessment of fasting blood sugar (FBS) and glycosylated haemoglobin (HbA1C) levels. All the assessment was done using auto-analyser. Plasma lipoproteins were assessed through liberman-Buchard reaction. All the results were recorded in Microsoft excel sheet and were analysed using SPSS software. Mean age of the patients was found to be 53.7 years. While analysing statistically, it was observed that HbA1c levels significantly correlated with FBS levels and serum lipid profile in diabetic patients. In type II diabetic patients, HbA1c is significantly correlated with serum lipid profile. HbA1c levels can be used as a predictor of dyslipidemia in diabetic patients._

**Key words--**Diabetes, Blood, Glucose, Lipid

I.   INTRODUCTION

Diabetes is one of the debilitating pathology affecting a significant proportion of world's population. It is expected that by 2025, approximately 300 million of world population will be affected with diabetes. However; in the recent past couple of decades, a striking rise in the incidence of diabetes have been observed, especially in developing countries. According to the data quoted in the past literature, early identification of diabetes, along with its severity leads to improvement in quality of life. In diabetic patients with poor glycaemic control, dyslipidemia is a common encountered associated manifestation. The pathogenesis of dyslipidemia in diabetic patients is multifactorial.[1-3]

Major pathway is due to reduction in lipoprotein lipase activity because of insulin deficiency. Evaluation of HbA1c (glycosylated Hb) levels are usually taken as a strong prediction for assessing the diabetic complications.

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Many diabetic subjects with presence of poor glycaemic profile are reported to be having dyslipidemic state such as an increase in triglycerides (TG), low-density lipoprotein cholesterol (LDL-C), and a decrease in high-density lipoprotein cholesterol (HDL-C).[4-6] Hence; the present study was undertaken for assessing correlation between fasting blood glucose, Hb1Ac and serum Lipid Level in Type II Diabetes patients.

II.   MATERIALS & METHOD

The present study was undertaken to assess the correlation between fasting blood glucose, Hb1Ac and serum Lipid Level in Type II Diabetes patients. Ethical approval was obtained from institutional ethical committee and written consent was obtained from all the patients after explaining in detail the entire research protocol. A total of 200 patients with confirmed diagnosis of type II diabetes mellitus were enrolled in the present study. Complete demographic and clinical data of all the patients was obtained. Patients with presence of any other metabolic disorder or any form of malignant neoplasm were excluded. Patients were called in the morning time and fasting blood samples were obtained and were sent to central laboratory for assessment of fasting blood sugar (FBS) and glycosylated haemoglobin (HbA1C) levels. All the assessment was done using auto-analyser. Plasma lipoproteins were assessed through liberman-Buchard reaction. All the results were recorded in Microsoft excel sheet and were analysed using SPSS software. Chi- square test and Pearson's correlation was used for assessing the correlation between fasting blood glucose, Hb1Ac and serum lipid levels.

III.   RESULTS

In the present study, a total of 200 diabetic patients were analysed. Mean age of the patients was found to be 53.7 years. 30.5 percent of the patients belonged to the age group of more than 50 years. 29.5 percent of the patients belonged to the age group of 41 to 50 years. 62 percent of the patients were males while the remaining were females. In the present study, while analysing statistically, we observed that HbA1c levels significantly correlated with FBS levels and serum lipid profile in diabetic patients.

Table 1: Demographic data

Parameter		Number of patients	Percentage
Age group (years)	Less than 30	25	12.5
	30 to 40	55	27.5
	41 to 50	59	29.5
	More than 50	61	30.5
Gender	Males	124	62
	Females	76	38

Table 2: Correlation of Glycaemic profile and lipid profile

Parameter	Correlation coefficient	p- value
HbA1c and FBS correlation	128.12	0.00*
HbA1c and lipid profile correlation	119.38	0.01*

*: Significant

IV.   DISCUSSION

Diabetes Mellitus is a spectrum of metabolic pathology occurring because of reduction in insulin secretion or due to occurrence of insulin resistance. The common risk of this pathologic entity is inadequate glycemic control creating an environment with increased risk of micro- and macro-vascular complications. These risks associated with diabetes include neuropathy, retinopathy, and nephropathy. Apart from these major complications, coronary artery and peripheral artery disease are also frequently seen in patients with poor diabetic control. Assessment of cardiovascular risk associated with diabetes is usually assessed by dyslipidemia and hypertension. Assessment of HbA1c given authentic details of the glycaemic profile of an individual and hence, has been often regarded as a standard of care (SOC) for pathologic analysis in diabetic patients. HbA1c provides a reliable measure of chronic glycemia and correlates well with the risk of long-term diabetes complications, so that it is currently considered the test of choice for monitoring and chronic management of diabetes.[7,8] Hence; the present study was undertaken for assessing correlation between fasting blood glucose, Hb1Ac and serum Lipid Level in Type II Diabetes patients.

In the present study, a total of 200 diabetic patients were analysed. Mean age of the patients was found to be 53.7 years. 30.5 percent of the patients belonged to the age group of more than 50 years. 28.5 percent of the patients belonged to the age group of 41 to 50 years. 62 percent of the patients were males while the remaining were females. Hussain A et al, in a previous study analysed the correlation between HbA1c and serum lipid profile in diabetic patients. Analysis of a total of 401 type 2 diabetic patients was done and mean glycaemic and lipid profile was analysed. They reported a significant positive association between glycaemic profile and lipid profile in diabetic patients. They also observed that HbA1c was a strong predictor of hypercholesterolemia. They concluded that in diabetic patients, HbA1c can be used as a positive indicator of dyslipidemia.[9]

In the present study, while analysing statistically, we observed that HbA1c levels significantly correlated with FBS levels and serum lipid profile in diabetic patients. Mang B et al conducted a study for assessing the efficacy of aqueous cinnamon purified extract in improving glycaemic and lipid profile in diabetic patients. They analysed a total of 79 diabetic patients in their study and randomly assigned them in two groups; one group was given cinnamon extract while the other group was given placebo. The entire study was conducted for a time period of four months. They observed significant improvement in the glycaemic and lipid profile of diabetic patients of both the study groups. However; improvement was significantly higher among patients of the cinnamon group. They concluded that in improving the glycaemic and lipid profile in diabetic patients, cinnamon extract plays a crucial role.[10] Naqvi S et al analysed the association between glycaemic profile and lipid profile in diabetic patients. They analysed 509 diabetic patients and monitored their glycaemic and lipid profile. They observed significant association between HbA1c and triglycerides in their study. They concluded that HbA1c could be utilized a strong predictor of triglyceride level in diabetic patients.[11]

In another study conducted by Begum A et al, authors analysed the correlation between lipid and glycaemic profile in diabetic patients. Assessment of a total of 105 diabetic patients was done and their lipid profile (TC, HDL-C, LDL-C, and TG) along with glycaemic profile (HbA1c and FBS) was analysed. From the results, they concluded that glycaemic profile significantly correlates with lipid profile in diabetic patients.[12] Alzahrani SH et al analysed the association between glycaemic profile and lipid profile of diabetic patients. They assessed a total

of 206 diabetic patients. They concluded that HbA1c significantly correlates with TGs but shows negative correlation with TC, LDL-C and HDL-C levels.[13]

Controversial results have been reported in the past literature in different studies conducted in different parts of the world. In one of the Turkish study conducted on diabetic patients, authors reported significant association between C, LDL and TGs levels with HbA1c levels. However; a study conducted in India failed to demonstrate any correlation between these parameters in diabetic patients.[14, 15] Similar some studies have demonstrated significant correlation while the others observed no correlation between glycaemic profile and lipid profile in diabetic patients brining on to the conclusion that future research is required for establishing the role of HbA1c as a useful marker for predicting dyslipidemia in diabetic patients.[16- 18]

V.   CONCLUSION

From the above results, the authors concluded that in type II diabetic patients, HbA1c is significantly correlated with serum lipid profile. Hence; HbA1c levels can be used as a predictor of dyslipidemia in diabetic patients.

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