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Association between FBS and serum lipid levels in diabetic dyslipidemic patients

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ABSTRACT

Diabetes mellitus is the most common metabolic disorder which is characterised by increased blood glucose level. Lipoprotein metabolism disorder is most common in type 2 diabetes mellitus and is known as diabetic dyslipidemia. It is characterized by increased total cholesterol, increased triglycerides (TG), increased low density lipoprotein cholesterol (LDL-C) and decreased high density lipoprotein cholesterol (HDL-C). Aim of the study was to analyze the correlation between FBS and different lipid parameters. Study was conducted as a prospective observational study in the cardiology department of a 500 bedded tertiary care hospital. In this study 165 diabetic dyslipidemic patients were chosen. FBS and serum lipid levels of these patients were analysed. There is a significant positive correlation between FBS, TG and LDL, and also there is a significant negative correlation between FBS and HDL.From this study it is concluded that increased levels of serum glucose are associated with increased levels of TG, LDL and decreased levels of HDL.

INTRODUCTION

Lipid abnormalities are associated with increased risk of cardiovascular events in both diabetic and non diabetic patients. Various studies have demonstrated that LDL, HDL, and triglycerides are independent predictors of CVD [1]. In the general population the incidence of cardiovascular disease is more common in patients with type 2 diabetes [2].

Lipoprotein metabolism disorder in diabetic population is known as diabetic dyslipidemia. It is characterized by increased total cholesterol, increased triglycerides (TG), increased low density lipoprotein cholesterol (LDL-C) and decreased high density lipoprotein cholesterol (HDL-C). In T2DM reduction in the suppression of hormone sensitive lipase activity, results in the increased intracellular hydrolysis of TG in the adipose tissues and also the free fatty acid released in the portal circulation stimulate VLDL secretion from liver leading to excess circulating TG concentration. LDL is produced from VLDL by a process known as beta shift. Thus, the pathogenesis of diabetic dyslipidemia is a complex phenomenon [3,4].

National Cholesterol Education Programme Adult Treatment III has been the recently revised and framed guideline which help the physician to provide better treatment to cardiovascular patients targeting low density lipoprotein as their primary goal [5].

MATERIALS AND METHODS

This is a prospective observational study which was conducted in cardiology department of a tertiary care teaching hospital after getting approval from an independant ethics committee. A total number of 165 patients were enrolled in the study based on predetermined inclusion and exclusion criteria. Cardiovascular patients age 30 years or more who were diagnosed to have both diabetes and dyslipidemia including those newly diagnosed with dyslipidemia and already on hypolipidemic therapy with a lipid profile of LDL-C >100mg/dl, total cholesterol >200mg/dl,HDL-C <40mg/dl and ≥60mg/dl and serum triglyceride >150mg/dl or change in any one of the above lipid parameter, as per NCEP ATP III guidelines were included in the study pregnant women and lactating mothers and mentally retarded were excluded from the study. All the required study materials (informed consent document, patient information sheet, patient information leaflet and data entry form) were designed. Lipid profile and fasting blood sugar levels were collected and correlated using pearson coefficient test. The correlation analysis was done for calculating the extend of association between various lipid parameters and FBS level. The correlation coefficient and its p value were found out.

RESULTS

In our study 165 patients were enrolled as per the inclusion

criteria. After statistical analysis of then collected data the following results were obtained. Table 1 shows the correlation between FBS and Triglycerides (r=0.431). Table 2 shows the correlation between FBS and LDL (R=0.447). Table 3 shows correlation between FBS and HDL (r=-0.320).

DISCUSSION

In our study a significant positive correlation was observed between FBS and triglyceride levels. A positive and significant correlation means, FBS is increasing with increase in triglycerides and vice versa. Similarly a significant correlation between FBS and LDL was also evident.

But in the case of HDL-C, a significant negative correlation was found which means, serum HDL-C levels decreased with rise in FBS levels and vice versa. A previous correlation study by P.Samatha et al showed a positive significant correlation between FBS and TG (r = 0.514) [8] . In a similar study, Khan et al. have showed the existence of a direct correlation between FBS with TC, TG and LDL and inverse correlation with HDL. HDL-C

Table 1 : Correlation between FBS and Triglycerides

Here the p-value is less than the significance level 0.01; the correlation between FBS and triglycerides is significant. A positive and significant correlation means, FBS is increasing with increase in triglycerides and decreasing with decrease in triglycerides.

	Mean	SD	Correlation	p – value
FBS	248.0	64.57	0.431**	0.000
Triglycerides	145.8	39.61		

Correlation is significant at 0.01 level.

Fig. 1 : Scatter Plot Showing Correlation between FBS and Triglycerides.

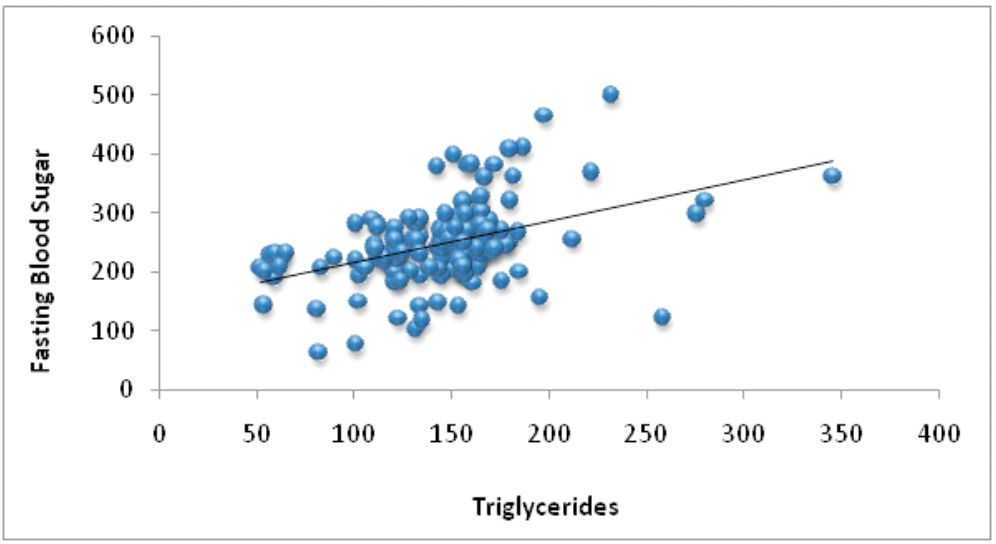

Table 2 : Correlation between FBS and LDL

Here the p-value is less than the significance level 0.01; the correlation between FBS and LDL is significant. A positive and significant correlation means, FBS is increasing with increase in LDL and decreasing with decrease in LDL.

	Mean	SD	Correlation	p – value
FBS	248.0	64.57	0.447**	0.000
LDL	149.1	30.10		

** Correlation is significant at 0.01 level.

Fig. 2 : Scatter Plot Showing Correlation between FBS and LDL

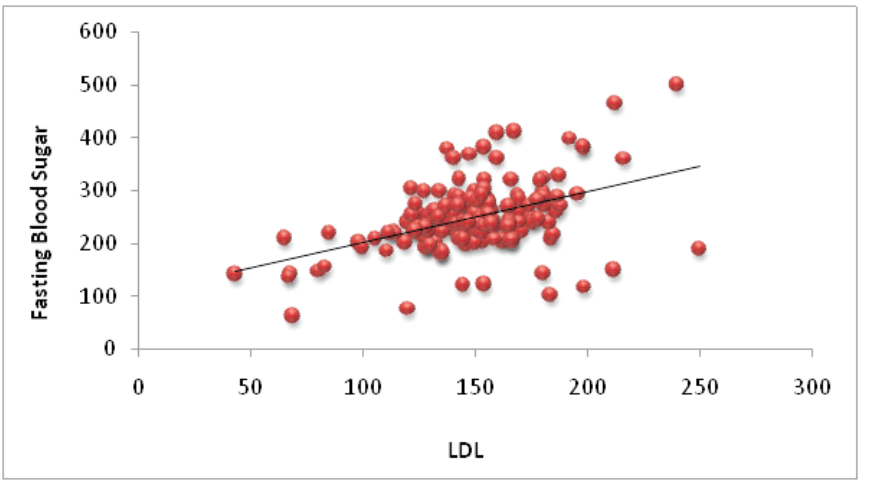

Table 3 : Correlation between FBS and HDL

Here the p-value is less than the significance level 0.01; the correlation between FBS and HDL is significant. A negative and significant correlation means, FBS is increasing with decrease in HDL and decreasing with increase in HDL.

	Mean	SD	Correlation	p – value
FBS	248.0	64.57	-0.320**	0.000
HDL	31.59	8.067		

** Correlation is significant at 0.01 level.

Fig. 3 : Scatter Plot Showing Correlation between FBS and HDL

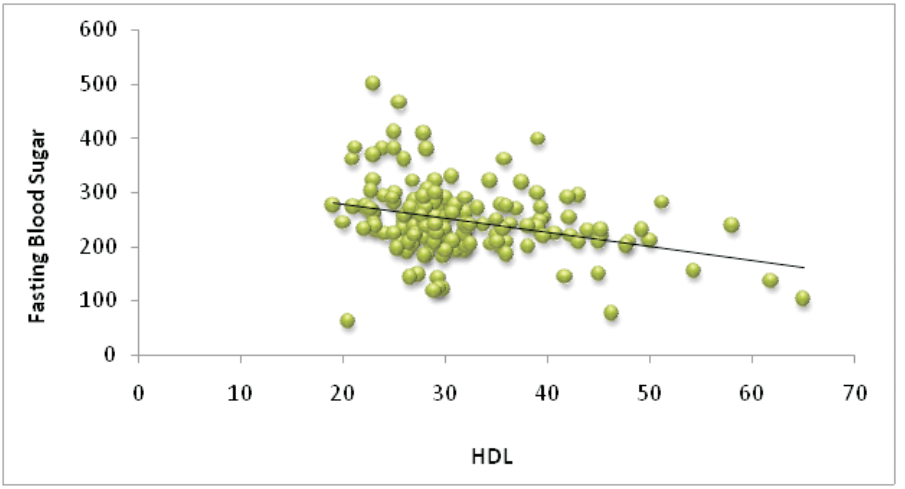

Table 4: Percentage distribution of lipid parameters

	Male		Female	
	Frequency	**Percentage**	**Frequency**	**Percentage**
LDL	104	63.03	50	30.30
TG	58	35.15	26	15.75
HDL	88	53.33	45	27.27
TC	50	30.30	20	12.12

levels were low in majority of the diabetic group in his study population. This decrease was found to be significant in T2DM patients[9]. Similar study by Harno K et al also reported a reduction in HDL-C in diabetic patients. This was attributed to the increased activity of hepatic lipases, which plays a major role in HDL-C metabolism [10]. However,a study by Joshi Raj Keshab et al reported a controversial statement, where no significant positive changes in HDL-C levels in diabetic patients were observed. Thus, it can be concluded that low HDL-C (<40 mg/dl) is an important CHD predictor and elevated HDL-C (40-60mg/dl) is a protector against CHD [11]. The findings in our study were consistent with the results of previous studies by Singh U et al and Del- Yassin H et al [12,13]. Reports by Nathan DM et al had very well confirmed the previous observations of increased LDL-C and decreased HDL-C in the type 2 diabetic population [14]. A Study by Agrawal Jyoti et al also suggested the abnormality in lipid metabolism in diabetic patients due to a difference in LDL receptor genes. In T2DM patients, LDL uptake by fibroblasts may be impaired. This results in increased LDL-C and decreased HDL-C and increased LDL:HDL ratio in type 2 diabetics. An elevated TG itself contribute to CVD in normal as well as in diabetic patients. It supports the atherogenic state seen with hyperglycemia [15].

CONCLUSION

The results of our study shows that elevated levels of FBS were associated with an increase in TG, LDL-C and decrease in HDL-C levels. This indicates that the diabetic population are more prone to cardiovascular diseases and they should undergo early monitoring and aggressive dyslipidemia management.

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