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Original Research Article

Correlation of fibrinogen level with lipid profile in type 2 diabetes mellitus

Venkatesh Amalappa Desai[1], Chandrakala[2]*, Anant A. Takalkar[3]

[1]Department of General Medicine, GIMS, Kalaburagi, Karnataka, India
[2]Department of General Medicine, KBNIMS, Kalaburagi, Karnataka, India
[3]Department of Community Medicine, MIMSR Medical College and YCRH, Latur, Maharashtra, India

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***Correspondence:**
Dr. Chandrakala,
E-mail: drmvkshirsagar@yahoo.co.in

ABSTRACT

Background: Increasing evidence from epidemiological studies suggest that elevated plasma fibrinogen levels are associated with an increased risk of cardiovascular disorders especially in diabetic patients. Objective was to correlate fibrinogen levels in patients of type-2 diabetes mellitus with lipid profile.
Methods: It is a descriptive observational study conducted among type-2 diabetes mellitus patients at Khaja Bandanawaz Institute of Medical Sciences, Gulbarga in year 2011. Newly detected type-2 diabetic patients with and without associated hypertension of more than 40 years of age belonging to both sexes were included.
Results: Total 104 patients were involved in our study. Of which 75 were males and 29 females. There was a significant positive correlation between plasma cholesterol level and plasma fibrinogen level. The patients who had serum triglyceride level between 100-149 mg/dL had plasma fibrinogen level about 4.19±0.1 g/L and those with serum triglyceride level more than 400 mg/dL < had 9.01±0.83 g/L plasma fibrinogen level. Significant positive correlation between serum triglyceride level and plasma fibrinogen level found. 36 patients with HDL level 35-39 mg/dL had plasma fibrinogen level of 5.9±1.50 g/L. So, there was a significant negative correlation between serum HDL and plasma fibrinogen level.
Conclusions: The present study showed positive correlation between serum cholesterol level, LDL level and triglyceride level with plasma fibrinogen levels. There was inverse relation with HDL level.

Keywords: Fibrinogen, Lipid profile, Type II DM

INTRODUCTION

Diabetes mellitus (DM) is the most common modern epidemic throughout world. This metabolic disorder affected the people worldwide. Even though diabetes has been known since antiquity, only in the last few decades new discoveries and research have provided considerable measures to prevent morbidity and mortality. Dyslipidemia is commonly seen diabetes and we know that Type 2 DM is one of the most common secondary causes of hyperlipidemia. The relationship between hyperlipidemia and vascular complication of diabetes has long been of interest because both tend to occur with greater frequency in Type 2 DM. Insulin resistance and obesity combine to cause dyslipidemia and hyperglycemia and hyperlipidemia have additive cardiovascular risk.[1-4]

Increasing evidence from epidemiological studies suggest that elevated plasma fibrinogen levels are associated with an increased risk of cardiovascular disorders, especially in diabetic patients.[5,6]

Impaired glucose tolerance exerts an influence by enhancing thrombogenic factors such as, fibrinogen in the diabetics. Fibrinogen, itself is determined by several modifiable and non-modifiable determinants like age, sex, smoking, body mass index (BMI), hypertension, alcoholism, glycemic control, lipid profile and urine albumin excretion rate.[7,8]

Objective was to correlate fibrinogen levels in patients of type-2 diabetes mellitus with lipid profile.

METHODS

The present descriptive observational study was carried out in 104 cases of type-2 diabetes mellitus who attended the out-patient department and admitted as in-patients at Medicine department of Khaja Bandanawaz Institute of Medical Sciences, Gulbarga in year 2011. A total of 104 known and newly detected type-2 diabetic patients with and without associated hypertension of more than 40 years of age belonging to both sexes were included. Type-2 diabetic patients associated with myocardial infarction, stroke, chronic inflammatory diseases, tuberculosis, malignancy, secondary hypertension and pregnancy were excluded from this study. Estimation of plasma fibrinogen was done by thrombin-clothing method by using FIBROQUANT KIT [Tulip Diagnostics (p) Ltd. The data was analyzed by using SPSS 17.0 version. Quantitative data was expressed as mean and standard deviation whereas qualitative data was expressed as percentages. Unpaired t test and correlation test was applied as a test of significance. A p value <0.05 was considered as significant whereas p<0.001 was considered as highly significant.

RESULTS

Total 104 patients were involved in our study. Of which 75 were males and 29 females. Majority of type-2 diabetic patients were in the age group of 50-59 years (32 patients, 42.7%). The mean age of the patient was 61.5 years. The sex distribution showed male preponderance in each age group and as a whole (Table 1).

Table 1: Distribution of subjects according to age and sex.

Age in years	Male		Female	
	Frequency	Percent	Frequency	Percent
40-49	9	12.0	11	37.9
50-59	32	42.7	8	27.6
60-69	11	14.7	6	20.7
70-79	9	12.0	3	10.3
>80	14	18.7	1	3.4
Total	75	100.0	29	100.0

Nine patients had serum cholesterol level between 100-149 mg/dL and mean plasma fibrinogen level of 7.43±1.01 and 64 patients had serum cholesterol level between 150-199 mg/dL and mean plasma fibrinogen level of 6.76±2.43. 24 patients had serum cholesterol level between 250-249 mg/dL and mean plasma fibrinogen level of 6.08±2.52 and remaining 3 patients had serum cholesterol level between 250-299 mg/dL with mean plasma level of 8.47±3.82. On applying correlation test, the correlation coefficient was found to be r=0.65 and t=10.1 (p<00001), which was significant. So, there was a significant positive correlation between plasma cholesterol level and plasma fibrinogen level (Table 2).

Table 2: Correlation of fibrinogen level with serum cholesterol.

Cholesterol level (mg/dL)	N	Mean	SD
100 - 149	10	7.43	1.01
150 - 199	66	6.76	2.43
200 - 249	24	6.08	2.52
250 - 299	4	8.47	3.82

Table 3 shows a linear increase in plasma fibrinogen level as serum triglyceride level increases. The patients who had serum triglyceride level between 100-149 mg/dL had plasma fibrinogen level about 4.19±0.1 g/L and those with serum triglyceride level more than 400 mg/dL < had 9.01±0.83 g/L plasma fibrinogen level. On applying correlation test, the correlation coefficient was found to be r=0.86 and t=30.16 (p<0.001), which was highly significant. So, there was a significant positive correlation between serum triglyceride level and plasma fibrinogen level (Table 3).

Table 3: Correlation of fibrinogen levels with serum triglyceride level.

Triglyceride level (mg/dL)	N	Mean	SD
100-149	6	4.19	0.1
150-199	10	4.8	0.18
200-249	18	5.63	0.45
250-299	35	5.12	0.43
300-349	25	6.35	0.21
350-399	8	9.43	0.13
>400	2	9.01	0.83

Twenty patients with HDL level 30-34 mg/dL had plasma fibrinogen level of 5.3±1.72 g/L, thirty six patients with HDL level 35-39 mg/dL had plasma fibrinogen level of 5.9±1.50 g/L, thirty patients with HDL level 40-44 mg/dL had plasma fibrinogen level of 5.4±1.36 g/L, twelve patients with HDL level 45-49 mg/dL had plasma fibrinogen level 5.3±1.10 g/L and lastly 3 patients with HDL level more than 50 mg/dL had plasma fibrinogen level of 5.3±1.19 g/L. On applying correlation test, the correlation coefficient was found to be r=-0.52 and t=8.09 (p<0.001), which was significant. So, there was a

significant negative correlation between serum HDL and plasma fibrinogen level (Table 4).

Table 4: Correlation of fibrinogen levels with serum HDL level.

HDL level (mg/dL)	N	Mean	SD
30-34	20	5.3	1.72
35-39	36	5.9	1.5
40-44	31	5.4	1.36
45-49	13	5.3	1.1
>50	4	5.3	1.19

Five patients with LDL level less than 50 mg/dL had plasma fibrinogen level 7.01±0.99 g/L. Thirty seven patients with LDL level between 50-99, had plasma fibrinogen level of 6.03±0.47 g/L. Fifty four patients with LDL level between 100-149 mg/dL had plasma fibrinogen level of 7.1±0.55 and lastly 4 patients with LDL level between 150-199 mg/dL had plasma fibrinogen level of 6.09±1.05. On applying correlation test, the correlation coefficient was found to be r=0.65 and t=6.1 ($p<0.01$) which was significant. So, there was a positive correlation between serum LDL level and plasma fibrinogen level (Table 5).

Table 5: Correlation of fibrinogen levels with serum LDL level.

LDL level (mg/dL)	N	Mean	SD
<50	6	7.01	0.99
50-99	39	6.03	0.47
100-149	54	7.1	0.55
150-199	5	6.09	1.05

DISCUSSION

In the present study, cholesterol level, serum triglyceride level and LDL level were found to correlate with mean plasma fibrinogen level and HDL level was negatively correlated. As serum cholesterol and triglyceride level increases plasma fibrinogen level also increases.

Gupta P et al in their study found significantly higher levels of cholesterol, LDL and triglycerides in the diabetic population; also, the fibrinogens were significantly higher in diabetics in comparison to normal healthy volunteers.[9]

In the study of Gray TC et al, they found that only the changes in plasma triglyceride concentration correlated with the changes in fibrinogen concentration.[10] So the change in triglyceride was identified as the only independent variable that predicted the changes in the fibrinogen concentration.[11,12]

Om P. Ganda et al in their study found a positive correlation of plasma fibrinogen level with total cholesterol but not with triglycerides and HDL cholesterol and also Gothenburg in his study found a positive correlation between fibrinogen level and total cholesterol.[12,13] Resch KL and Ernst E also found positive correlation between plasma fibrinogen level and total and LDL cholesterol.[13]

But other studies such as lazzari P et al study observed no correlation between plasma fibrinogen levels and lipid profiles.[14] Antanio Ceriello et al and Resh KL observed a negative correlation between plasma fibrinogen level and HDL-cholesterol whereas Barazzoni R et al observed a negative correlation between plasma fibrinogen level and triglyceride level.[13,15,16]

CONCLUSION

The present study showed positive correlation between serum cholesterol level, LDL level and triglyceride level with plasma fibrinogen levels. There was inverse relation with HDL level.

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