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A Study of Plasma Fibrinogen Level in Type 2 Diabetic Patients with or Without Microalbuminuria and Retinopathy

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Abstract:
Background: *In type 2 diabetes, fibrinogen levels have been demonstrated to predict the progression to overt nephropathy. Hyperfibrinogenemia, an indicator of inflammation, is also associated with the presence of endothelial dysfunction, insulin resistance, hypercoagulability, and increased blood viscosity and is a marker of unstable atherosclerotic lesions. Increase in blood viscosity and other haematological changes are now seen to contribute to the development of diabetic retinopathy much more than previously known.*
Objectives: *Aim of my study was to establish the association between Plasma Fibrinogen with microvascular complications in type 2 diabetes mellitus (Retinopathy and Microalbuminuria) .*
Methods*:It is a tertiary hospital based observational cross sectional study held from March 2013 to June 2014 where 100 type 2 diabetic patients of both gender were selected by simple random method depending upon the inclusion criteria.*
Results*:Among the study population male : female was 60:40.Among them 43% were smokers.38% and 56% of the study population was under the treatment of statin and ACEI respectively.35% of the study group was having NPDR and 18% having PDR.Mean Fibrinogen level of the study population was 325.49mg/dl. Mean ACR level of the study group was 468.76mg/gm of Creatinine.Statistically significant association was found between log ACR level and duration of Diabetes.Statistically significant association was found between Log ACR level and serum fibrinogen level.Statistically significant positive correlation was found between Diabetic retinopathy with level of serum fibrinogen and urinary ACR both in univariate and multivariate logistic regression analysis.Statistically significant association was found between diabetic retinopathy and age, BMI, duration of DM & treatment, creatinine, Statin & ACEI intake .Serum HDL and CRP level were seen to be inversely related with diabetic retinopathy and also with Log ACR.*
Conclusion*:This study uncovers that serum fibrinogen has a strong influence on diabetic retinopathy and urinary ACR.Our data indicates that serum fibrinogen level might have a clinical implication in the process of progression of diabetic retinopathy and nephropathy in type 2 diabetic population. Thus serum fibrinogen level can be used as a surrogate marker of diabetic nephropathy and retinopathy as it is presently used in Cardiovascular and peripheral arterial diseases*
Abbreviations*:**ETDRS**: Early Treatment of Diabetic Retinopathy Study,**LDL**: low density lipoprotein,**HDL**: high density lipoprotein,**NPDR**: non proliferative diabetic retinopathy,**PDR**: proliferative diabetic retinopathy,**CRP**: C-reactive protein,**DFA**: Digital Fluorescence Angiography,**OCT**: Ocular coherence tomography,**ACEI**: Angiotensin converting enzyme inhibitor,**OHA**: Oral hypoglycaemic agents,**TG**: Triglyceride,**BMI**: Body mass index, **ACR**; albumin /creatinine ratio.*

Keywords:*Type 2 diabetes mellitus, retinopathy, nephropathy,ACR,fibrinogen*

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I. Introduction

Type 2 diabetes is frequently associated with an acute phase reaction, suggestive of a low-grade inflammatory status In fact, markers of acute-phase response, including serum amyloid A (SAA), C-reactive protein (CRP), and IL-6, the main mediators of the response, have been shown to be elevated in patients with type 2 diabetes and with the metabolic syndrome It is well known that in the general population, as well as in diabetes, these acute-phase markers are associated with increased cardiovascular risk, because chronic inflammation is one of the pathogenetic mechanisms of atherosclerosis. In contrast, the relationships between low grade inflammation and diabetic microangiopathy are still unclear. As far as nephropathy is concerned, several studies have examined the relationships with inflammation, leading to conflicting results. Most studies have reported an increase in acute-phase markers in patients with nephropathy and also in patients with microalbuminuria. Fibrinogen has been reported to be associated with both cardiovascular risk in type 1 and type 2 diabetes .In type 2 diabetes, fibrinogen levels have been demonstrated to predict the progression to overt nephropathy . Hyperfibrinogenemia, an indicator of inflammation, is also associated with the presence of endothelial dysfunction, insulin resistance, hypercoagulability, and increased blood viscosity and is a marker of unstable atherosclerotic lesions. Increase in blood viscosity and other haematological changes are now seen to contribute to the development of diabetic retinopathy much more than previously known.Elevation of Plasma Fibrinogen is thought to be one of the major factors associated with this increase in blood viscosity. The aim of the present study was to explore the relationships between serum fibrinogen and microvascular complications in the form of retinopathy and nephropathy in patients with type 2 diabetes.

AIMS AND OBJECTIVES:

This study probed into the association of plasma fibrinogen with microvascular complications(microalbuminuria and retinopathy) in adult diabetic patients attending out patient department or admitted indoor,Medicine Dept.& Department of Endocrinology Medical College,Kolkata.

SPECIFIC OBJECTIVES OF THIS STUDY:

1. To find out the correlation between Plasma Fibrinogen with both Retinopathy and Microalbuminuria together.
2. To find out the correlation between Plasma Fibrinogen with Microalbuminuria only.
3. To find out the correlation between Plasma Fibrinogen with Retinopathy only.

II. Materials And Methods

1.**STUDY AREA** –This study was done in Medical College , Kolkata .Patients were randomly selected from out patient department of General Medicine and department of Endocrinology who attended for their illness and who were suffering from type 2 diabetes mellitus. In indoor patients here also selected who were admitted in the department of General Medicine,MedicalCollege,Kolkata.A proper informed consent was taken. The subjects belong to various districts of West Bengal.

2.**STUDY POPULATION** – 100 adults (aged more than 18 years) diabetic patients of both genderwere randomly selected who attended outpatient department or admitted Indoor department of General Medicine & Department of Endocrinology Medical College, Kolkata

INCLUSION CRITERIA*:*

Aged more than 18 years
Diabetes irrespective of duration of the disease
Ability and willingness to participate based on information given to patient and to health facility

EXCLUSION CRITERIA*:*

Aged less than 18 years
Hypertension
Sepsis
Pregnant woman
Known coagulopathy
Who are not willing to give consent

STUDY PERIOD – From March2013 to June2014
SAMPLE SIZE– 100 adult diabetes of both gender
SAMPLE DESIGN – Simple Random Selection
STUDY DESIGN-A Hospital based observational cross sectional study
PARAMETERS TO BE STUDIED :
Questionnaire

Clinical Examination
Laboratorical Examination
Ophthalmological Examination –
Slit lamp bimicroscopy with 90 D lens
Direct ophthalmoscopy
Indirect ophthalmoscopy with 20 D lens
Fundus Photography
DFA and OCT when required

STUDY TOOLS*:*
a)Blood Examination
Complete Haemogram
Fasting Blood Sugar(FBS)
Post parandial Blood Sugar(PPBS)
Glycosylated haemoglobin(HbA_1C)
Blood urea
Serum creatinine
Plasma Fibrinogen
CRP
Lipid profile(HDL, LDL, TG)

b) Urine Examination
Routine Examination
Microscopical Examination
Albumin Creatinine Ratio(ACR)

c)Ophthalmological Examination
Slit Lamp
90D,20D convex lens
Direct Ophthalmoscope
Indirect Ophthalmoscope

STUDY TECHNIQUE*:* Meeting the inclusion criteria and eliminating the exclusion criteria randomly selected type 2 diabetic patients were asked some questions,examined clinically,10 ml of blood &10 ml of aseptically taken urine will be examined laboratorically. The patients were sent to the department of ophthalmology for assessment of diabetic retinopathy by slit lamp biomicroscopy, direct ophthalmoscopy, indirect ophthalmoscopy.OCT and DFA were done when required.

Spot urine sample was tested for microalbuminuria by immunoturbidimetric or spectrophotometric method at the laboratory. Microalbuminuria is represented as Albumin Creatinine Ratio(ACR) by mcg/mg in the range of 30 – 300mcg/mg.HbA1C was measured by HPLC. total cholesterol (enzymatic methods-in the presence of cholesterol oxidize), triglycerides (in the presence of glycerokinase), and the HDL fraction by direct method. Automatic analyzerCoba Integra 400/700 (ROCHE Diagnostics) was used. The LDL fraction was evaluated using the Friedewald formula. Non-HDL cholesterol was determinate as a value of total cholesterol minus HDL cholesterol. Fasting plasma glucose concentration was evaluated using the enzymatic-photometric method, in the presence of glucoso-dehydrogenase. All analyses were done according recommendation of International Federation of Clinical Chemistry and Laboratory Medicine.Plasma Fibrinogen was measured by Electromechanical clot detection technique in the laboratory.CRP was measured by particle enhanced nephelometric immunoassay on a fully automatic BNII nephelometresystem.This assay is based on an immune reaction involving specific antibody , covalently coated with core shell-type particles.

ANALYSIS OF DATA*:* The data was analysed by the following standard statistical method. Data entry and statistical analysis were done using SPSS version 20.0. 10. For analytical statistics, Chi-square was used where appropriate. For all the statistical tests of significance, p value of <0.05 was considered to reject the null hypothesis. Then relationship between various factors was studied using univariate & multivariate regression analysis. The relationship between Nephropathy (Log ACR) and various independent variables was studied using Linear regression model whereas association between Diabetic Retinopathy and other independent variables was studied using Logistic regression model. The final multivariate regression model contained variables which were found significant during univariate analysis with P-value <0.05.RESULTS AND ANALYSIS

Table-1: Age and Sex distribution of the study population: (n=100)

	Sex		Total (%)
	Male (% within age group)	**Female (% within age group)**	
20 - 30 yrs	3(60%)	2(40%)	5(5%)
31 - 40 yrs	16(66.7%)	8(33.3%)	24(24%)
41 to 50 yrs	24(58.5%)	17(41.5%)	41(41%)
51 - 60 yrs	17(56.7%)	13(43.3%)	30(30%)
Total	60(60%)	40(40%)	100(100%)

Comments: Overall among the study population majority were male(60%).Mostly belonged to age group 41 to 50 yrs(41%) followed by 51 to 60 yrs(30%).Only 5% were in the age group 0f 20 to 30 yrs.

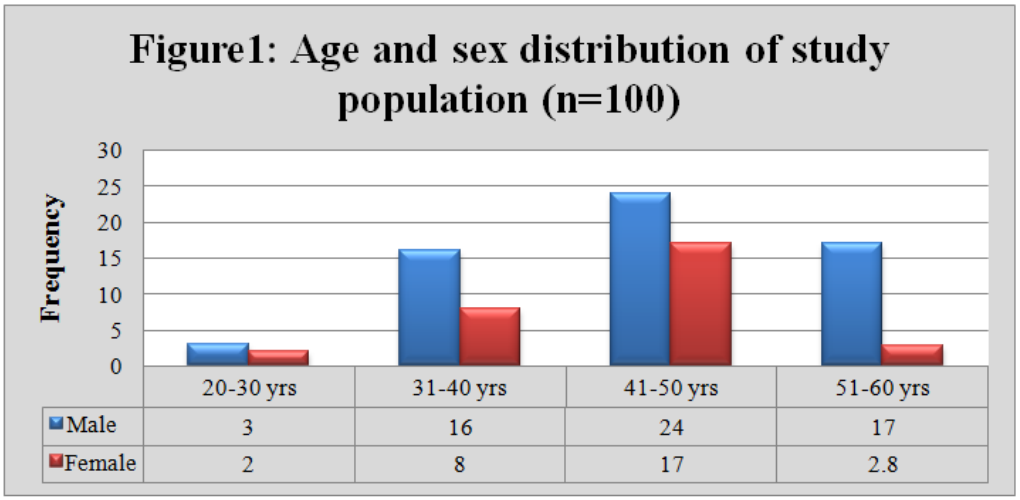

Table-2: Distribution of the study population a/c type of diabetic retinopathy: (n=100)

Type of diabetic retinopathy	Frequency	Percent
No DR	47	47.0
NPDR	35	35.0
PDR	18	18.0
Total	100	100.0

Comments: Among the study population majority(47%) having no DR, 35% having NPDR & rest only 18% having PDR.

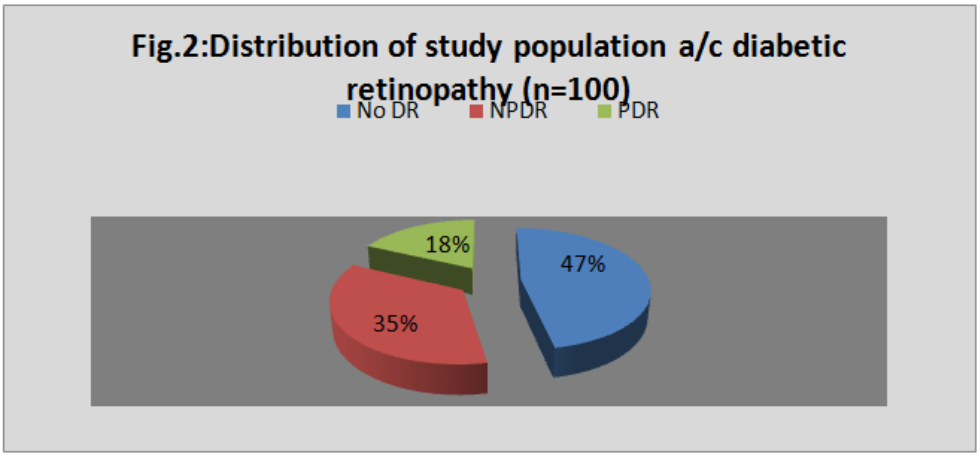

Table-3: Distribution of the study population a/c Diabetic Retinopathy and Sex: (n=100)

Diabetic Retinopathy	Gender		Total
	Male	Female	
No Diabetic Retinopathy	31(66.0%)	16(34.0%)	47(47.0%)
(NPDR	20(57.1%)	15(42.9%)	35(35.0%)
PDR	9(50.0%)	9(50.0%)	18(35.0%)
Total	60(60.0%)	40(40.0%)	100(100.0%)
Pearson Chi-Square: 1.564, df: 2; P Value: 0.457			

Comments: Among the study population of no DR, majority were male(66%).Among the NPDR patients 20 patients (57.1%) were male ,rest are female and among the PDR patients males & females were equally distributed. But there was no statisticallysignificant difference found in the distribution of different types of DR among males and females.

Fig. 3: Distribution of the study population a/c Diabetic Retinopathy and Sex

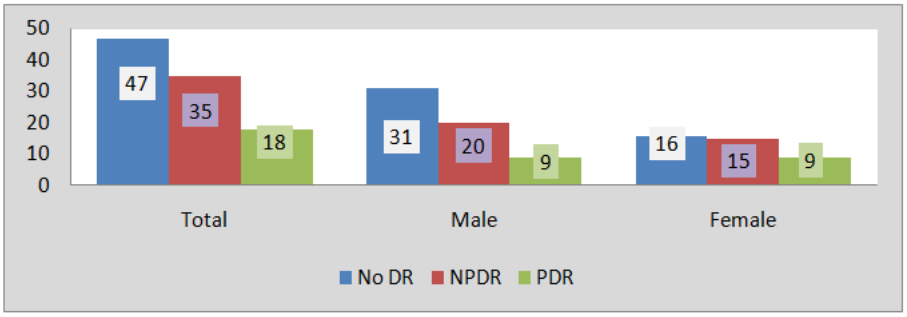

Table- 4: Descriptive statistics of Study variables (n=100)

Variables	Minimum	Maximum	Mean	Std. Deviation
Age in years	25	59	45.48	8.42
Body Mass Index	22.0	41.0	29.84	3.33
Duration of DM (Years)	1	19	8.92	3.91
Duration of treatment (years)	0	18	6.45	4.2
Total leukocyte count	5000	11800	8010.26	1300.85
Serum Fibrinogen	90	670	352.49	123.31
Fasting blood sugar	110	320	152.37	29.21
PPBS	132	460	183.54	43.31
HbA1C	6.5	12.4	8.6210	3.10
Serum Urea	20	56	32.93	6.07
Serum Creatinine	0.60	1.60	0.9512	0.22
Urinary ACR	18	2900	468.76	613.95
Serum LDL	76	185	102.16	20.58
Serum HDL	23	56	39.90	6.92
Serum TG Level	120	428	175.26	55.45
C-reactive protein	2.0	9.0	4.42	1.83

Comments: Mean age of study population was 45.48 yrs with SD of 8.42.Mean BMI is 29.84 kg/m2 with SD of 3.33.Mean duration of diabetes is 8.92 years with SD of 3.91 but mean duration of treatment was 6.45 years with SD of 4.2.Mean serum fibrinogen level of study population was 325.49 with SD of 123.31. Mean urinary ACR was 468.76 mg/gm of Cr with SD of 613.95.

Table-5: Correlation between Serum Fibrinogen and logACR among the study population(n=100)

Study Variables		**LOG ACR**
Fibrinogen	Pearson Correlation	**0.613****
	Sig.(2-tailed)	0.000
**Correlation is significant at the 0.01 level(2-tailed)		

Comments: When the correlation of nephropathy in the form of logACRwas studied with serum fibrinogen , statistically significant positive correlation was found withpearson correlation value of 0.613

Table-6: Univariate Linear Regression:Association of Log ACR with other study variables: (n=100)

Dependent Variable: Log ACR	Standardized Coefficients (Beta)	P Value	95 % Confidence Interval for B	
			Lower	Upper
Serum Fibrinogen	**0.613**	0.00	0.005	0.008
Age in years	**0.603**	0.00	0.073	0.124
Body Mass Index (BMI)	**0.506**	0.00	0.135	0.275
HbA1C	0.94	0.355	-0.020	0.056
Serum LDL	**0.618**	0.00	0.030	0.051
Serum HDL	**-0.577**	0.00	-0.145	0-.081
Serum TG Level	**0.571**	0.00	0.010	0.018
C-reactive protein	**-0.567**	0.00	-0.540	-0.297
Duration of DM	**0.672**	0.00	0.181	0.284
Duration of treatment in years	**0.705**	0.00	0.179	.269
Serum Creatinine	**0.722**	0.00	3.497	5.162

Comments: When correlation of logACR was studied with other variables by univariate linear regression it was found that statistically significant positive correlation with serum fibrinogen, age, BMI, LDL, TG,duration of DM & duration of treatment, creatinine and negative correlation with HDL , CRP but no correlation with serum HbA1C.

Table-7: Multivariate Linear Regression:Association of Log ACR with other study variables: (n=100)

Dependent Variable: LOG ACR	Standardized Coefficients (Beta)	Sig.	95.0% Confidence Interval for B	
			Lower	Upper
Serum Fibrinogen	**0.277**	**0.000**	**0.001**	**0.005**
Age in years	0.012	0.916	-0.033	0.037
Body Mass Index	0.077	0.333	-0.032	0.095
HbA1C	0.056	0.371	-0.013	0.034
Duration of DM	**0.292**	**0.001**	**0.042**	**0.160**
Duration of treatment in years	0.058	0.693	-0.074	0.112
Serum LDL	0.044	0.658	-0.010	0.016
Serum HDL	**-0.163**	**0.006**	**-0.062**	**-0.02**
C-reactive protein	**-0.210**	**0.04**	**-0.196**	**-0.34**
Body Mass Index	0.077	0.333	-0.032	0.095
Serum TG Level	0.124	0.179	-0.001	0.007
Serum Creatinine	0.208	0.072	-0.116	2.610

Comments: When the correlation oflogACR& serum fibrinogen was studied using multivariate linear regression model (model adjusted for all other independent variables which showed statistically significant correlation with logACR in univariate model), It was found that --

The correlation coefficient of logACR& serum fibrinogen decreased to 0.277 from 0.613.But the correlation between logACR& serum fibrinogen is still statistically significant. So 1 unit change of fibrinogen leads to further change of logACR by 0.277

Among the other individual variables duration of DM, Serum HDL, CRP were statistically significantly correlated with logACR. Duration of DM is positively & rest two(HDL& CRP) negatively correlated.

All other variables (age,BMI, duration of treatment, LDL, TG, creatinine, HbA1C) which were found to have statistically significance in univariate model but lost their significance in multivariate model when adjusted for other variables.

Table-8: Univariate Logistic Regression: Association of Diabetic Retinopathy with other study variables: (n=100)

		DR	No DR	Odds Ratio	95% C.I.for EXP(B)	
					Lower	Upper
Age (in years)	Continuous			**1.254**	1.150	1.368
Sex	Female	24(60%)	16(40%)	1.603	0.713	3.60
	Male(ref)	29(48.3%)	31(51.7%)			
BMI	Continuous			**1.37**	1.145	1.64
H/O Smoking	Yes	21(48.8%)	22(51.2%)	0.746	0.337	1.65
	No(ref)	32(56.1%)	25(43.9%)			
Duration of DM	Continuous			**2.02**	1.53	2.67
Duration of Treatment	Continuous			**1.85**	1.45	2.35
Serum Fibrinogen level	Continuous			**1.18**	1.01	1.25
Log ACR	Continuous			**15.15**	4.03	56.98
Urinary ACR	Continuous			**1.2**	1.09	1.24
HbA1C	Continuous			0.989	0.933	1.048
Serum Creatinine	Continuous			**35.34**	4.29	16.20

Serum LDL	Continuous			**1.12**	1.061	1.166
Serum HDL	Continuous			**0.85**	0.792	0.921
Serum TG Level	Continuous			**1.04**	1.014	1.052
C- Reactive Protein	Continuous			**0.39**	0.266	0.568
H/O Statin Intake	Yes	33(86.8%)	5(13.2%)	**13.86**	4.70	40.85
	No(ref)	20(32.3%)	42(67.7%)			
H/O ACEI Intake	Yes	45(80.4%)	11(19.6%)	**18.41**	6.70	50.58
	No(ref)	8(18.2%)	36(81.8%)			

Among the study population, significantly more risk of diabetic retinopathy was associated with age, BMI, duration of DM & duration of treatment, serum fibrinogen, urinary ACR, creatinine, TG, statin & ACEI intake. Serum HDL level & CRP were found to have inversely related with the diabetic retinopathy.
But gender of the patient , history of smoking & serum HbA1C lost their significance in univariate logistic regression model.

Table-9: Multivariate Logistic Regression: Association of Diabetic Retinopathy with other study variables: (n=100)

		DR	**No DR**	**Adjusted Odds Ratio**	**95% C.I. for EXP(B)**	
					Lower	**Upper**
Age	Continuous			**1.216**	**1.002**	**1.476**
Sex	Female	24(60%)	16(40%)	1.18	0.243	9.54
	Male(ref)	29(48.3%)	31(51.7%)			
BMI	Continuous			0.949	0.653	1.379
Duration of DM	Continuous			**2.20**	**1.25**	**3.86**
Duration of Treatment	Continuous			0.445	0.10	2.07
Serum Fibrinogen level	Continuous			**1.21**	**1.01**	**1.34**
Urinary ACR	Continuous			**1.012**	**1.005**	**1.02**
HbA1C	Continuous			0.550	0.09	3.535
Serum LDL	Continuous			1.104	0.93	1.31
Serum HDL	Continuous			1.277	0.88	1.85
Serum TG Level	Continuous			1.032	0.934	1.13
C- Reactive Protein	Continuous			**0.47**	**0.304**	**0.76**
H/O Statin Intake	Yes	33(86.8%)	5(13.2%)	**8.87**	**2.39**	**85.79**
	No(ref)	20(32.3%)	42(67.7%)			
H/O ACEI Intake	Yes	45(80.4%)	11(19.6%)	**24.6**	**3.06**	**22.40**
	No(ref)	8(18.2%)	36(81.8%)			

Comments:

I. Age of the patient, duration of DM, urinary ACR, serum fibrinogen found to be the major predictors of diabetic retinopathy in multivariate logistic regression model.

II. Association of Diabetic retinopathy with serum LDL , TG, HbA1C,duration of treatment, BMI and gender of the patient lost their significance when adjusted for other variables by multivariate logistic regression model.

III. Serum HDL and serum CRP were found inversely related to the diabetic retinopathy.

III. Discussion

Among the study population 60% are male , females are 40%. Majority of the patients belonged to the age group of 41 to 50 years both in case of males and females. Among the male patients 24% and among the female patients 17% were in the age group of 41 to 50 years of the total study population. Only 5% of total population belonged to the age group of 20 to 30 years(3% for male & 2% for female).Among the study population 35% patients had different grade of Nonproliferative diabetic retinopathy(NPDR) according to the ETDRS classification system,18% patients had proliferative diabetic retinopathy(PDR) but majority of the patient (47%) had no form of diabetic retinopathy(table2 results and analysis). Among the NPDR patients 57.1% were male(20% of total patients) and 42.9% were females(15% of total patients).But on the other hand in PDR patients its distribution is equal(9% of whole population for male and female separately)But this distribution of different types of diabetic retinopathy among the male and female are not statistically significant with P-value of 0.457(table 3 results and analysis).

In our present study the values of serum fibrinogen were 352.49±123.31, urinary albumin creatinine ratio were 468.76±613.95. The values of serum LDL are 102.16±20.58, serum HDL 39.90±6.92 and CRP 4.42±1.83.Mean duration of diabetes was 8.92 years with SD of 3.91 whereas mean duration of treatment was 6.45 years with SD of 4.2(table 4 results and analysis)

Our study revealed statistically significant positive correlation between logACR and serum fibrinogen level with pearson correlation value of 0.613 and significance(2-tailed) of 0.000.This results are corroborative of

previous studies.Y. Aso et al. and J.Lin et al.say increased coaguability may impair endothelial function thus promoting macrovascular and worsening microvascular diseases.(4,5). V.M.Dalla , M.Mussap et al. supports the associations between plasma fibrinogen and diabetic nephropathy in the form of albumin to creatinine ratio(6,7), reduced glomerular function or increased glomerular basement membrane width(4,6).Fibrinogen may be associated with GBM thickening not only via inflammatory mechanism but also through endothelial damage, coagulant activity and platelet activation.CasaleMonferrato study (18) and Asakawa H et al. study demonstrated that fibrinogen is an independent predictor of progression to overt nephropathy in type 2 diabetes.But other previous studies(8,9) hypothesize a positive feedback loop in which renal insufficiency leads to elevation of inflammatory markers(fibrinogen) which then leads to progression of renal disease and further increases inflammatory markers.

In univariate logistic regression model in our study ,statistically significant more risk of diabetic retinopathy was associated with age, duration of diabetes, duration of treatment, urinary ACR, creatinine,triglyceride, BMI, LDL, statin & ACEI intake apart from serum fibrinogen level. Serum HDL and CRP were found to be inversely related.But sex of the patient, smoking, serum HbA1C lost their significance in this model(table 8 results and analysis). When adjusted for other variables by multivariate logistic regression model, association of diabetic retinopathy with serum LDL, TG, HbA1C, duration of treatment, BMI lost their significance.But serum fibrinogen still found to be the major predictor of diabetic retinopathy in multivariate logistic regression model in addition to age of the patient, duration of diabetes and urinary ACR. Inverse relation of diabetic retinopathy with the serum HDL and CRP is still present in multivariate model also(table 9).Both in univariate and multivariate logistic models, duration of diabetes is the strongest predictor. This finding is consistent with the findings of previous study(11). Our findings is in accordance with the previous investigations in which increased fibrinogen is associated with the diabetic retinopathy(7).Asakawa et al. found that plasma fibrinogen is independently associated with existence of diabetic retinopathy but not significantly different when comparing different grade of diabetic retinopathy(12,13)

The findings of this study had a number of important implications for future practice. The study may be of practical worth, if treatment measures can be found that can safely lower the Plasma Fibrinogen levels, either in the form of medications or lifestyle modifications. Prevention of diabetic retinopathy may be possible in such a case. Also, fibrinogen levels pre-treatment and during on-going treatment could be a potential indicator for efficacy. Fibrinogen levels could be a potential marker for the prediction and prevention of diabetic retinopathy.(14,15,16) Fortunately, one of the antidiabetic compounds, metformin, has a direct effect on PAI-164 and helps to reduce hypofibrinolysis (1,2,3,20) and it was recently shown that metformincontributes to increased lysability of fibrin by interference with the thrombin activation of factor XIII.(17,18,19).

LIMITATIONS OF THE STUDY

1. The nature of investigations involved were too costly to be carried out in a government hospital setup. This limited the study population to only 100 cases.
2. Recall bias by the patient regarding the duration of diabetes and duration of treatment
3. The cross sectional nature of the study did not permit the determination of causality. Large prospective trials and interventional studies are needed to better assess the relationship between degree of urinary albumin excretion and retinopathy with serum fibrinogen concentrations.
4. 4.A limitation of our study was that we did not have any direct measure of GFR which could be the ideal tool for assessment of diabetic nephropathy.
5. Few patients who are advised for DFA and 3D OCT from the department of Ophthalmology(RIO) failed to follow it.
6. 6.Last but not the least, this study was done in tertiary care hospital, so it could not be categorised as a general population based study.

IV. Summary And Conclusion

Fibrinogen is an acute phase reactant protein and also coagulation factor I. In the previous studies it was well established that fibrinogen is an independent risk factor for cardiovascular diseases in type 2 diabetic patients and previously used as a surrogate marker for cardiovascular risk. This study uncovers that serum fibrinogen has a strong influence on diabetic retinopathy and urinary ACR.Our data indicates that serum fibrinogen level might have a clinical implication in the process of progression of diabetic retinopathy and nephropathy in type 2 diabetic population. Thus serum fibrinogen level can be used as a surrogate marker of diabetic nephropathy and retinopathy as it is presently used in Cardiovascular and peripheral arterial diseases. So this small study highlights the fact interventional strategy addressing to lower the level of Fibrinogen will go long way in prevention of some vital complications of diabetes. Large longitudinal Prospective study is needed to be carried out to substantiate our thought-provoking observation from the study.

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