

Study of Lipid Profile in Diabetic Cataract Patients Attending Rio Lab



Medical Science

KEYWORDS : Lipid profile; diabetes ; HbA1c; serum; cataract

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ABSTRACT

Introduction:- Most of the diabetic patients used to have high lipid profile. As from the previous studies it has been seen that there is significant rise in serum triglyceride and HDL level in diabetic patient. On the basis of these studies the present study was aimed to evaluate the lipid profile among diabetic patients, depending on the HbA1c level and establish a relation of serum lipid profile in the early development of cataract in diabetics. Method:- This study was carried out with 100 diabetic patients which were classified into two groups depending on serum HbA1c level. The serum lipid profile and HbA1c was estimated by using system Vitros integrated 5600. Result:- A highly significant ($p < 0.0001$) was seen in age and HbA1c level between two groups. The lipid profile between the two groups are found to be significant. Conclusion:- From the present study we can conclude that high lipid profile can be an etiological factor in the early development of diabetic cataract and it is advisable to evaluate a regular lipid profile of the diabetics in order to prevent early development of cataract .

INTRODUCTION

Diabetes mellitus is now defined as a group of metabolic diseases characterized by hyperglycemia resulting from defects in insulin secretion , insulin action or both[1]. Diabetes mellitus is considered as an all organ affecting disease that affects all stages of development also. As it affects almost all organ and tissues of the body, it has been regarded as a Prince of Diseases[2].

Cataract is a major cause of blindness and low vision worldwide. It is estimated that 44.1% of blind cases and 51.6% of patients with low vision have cataract[3]. The opacity of the crystalline lens of the eye results in visual defects in cataract[4]. The development of cataract is a complex, multifactorial process and several factors such as genes , gender, diabetes, geographic location, UV light exposure, level of education, occupational status and nutritional factors in the daily diet have been found to be associated with cataract formation. Age is the most important risk factor and about 85% of involved patients have age-related cataract[5].

People with diabetes suffer from blindness due to cataract. Numerous studies have documented an association between diabetes and cataracts. This association is supported by an abundance of data from clinical epidemiological studies and basic science studies[6,7].

The Blue Mountains Eye Study showed that impaired fasting glucose in the absence of clinical diabetes was also a risk factor for the development of cortical cataract[6]. There is additional evidence that the risk of cataract increases with increasing diabetes duration and severity of hyperglycemia[8]. Deposition of advanced glycation end products in the lens has been postulated as one possible pathogenic mechanism for diabetic cataract[9].

The prevalence of dyslipidemia in diabetes mellitus is 95%[10]. It is known that many diabetics have hypercholesterolemia and hypertriglyceridemia[11].

Early detection and treatment of hyperlipidemia in diabetes mellitus can prevent the progression of complication due to lipid abnormalities[12].

Aim and Objective

On the basis of the established data of relation of lipid profile in diabetic [12] and diabetic cataract[13] the present topic is aimed to show a role of serum lipid in the development of cataract and

with an objective to probe the reliability of the findings as a possible preventive factor in the early development of diabetic cataract.

MATERIAL AND METHOD

It is a cross sectional observational study conducted in the department of Biochemistry in collaboration with the Regional Institute of Ophthalmology, GMCH Guwahati. The duration of the study was one year. Diabetic cataract cases , who were scheduled to undergo cataract surgery in the Regional Institute of Ophthalmology were taken as cases. A proforma was used to collect the baseline data and written consent was taken after proper explanation of the need of the study. Detailed history was taken and proper examination of both systemic and ocular examination was performed to fulfil the inclusion and exclusion criteria.

Inclusion criteria

Established cases of diabetic cataract of both males and females.

Exclusion criteria

Patients of systemic diseases other than diabetes, on steroid, diuretics are excluded from the study.

The diagnosis of cataract was done after doing slit lamp biomicroscopy.

The fasting blood samples were collected for estimation of lipid profile, fasting blood sugar and HbA1c. The estimation was done using Vitros integrated 5600.

Depending upon the result of fasting sugar the patients were classified into two groups

Group A Diabetic cataract case with HbA1c > 6 to 9 .

Group B Diabetic cataract cases with HbA1c > 9.

Ethics

The study is carried out after getting the approval from Institutional Ethical Committee of Gauhati Medical College & Hospital.

Statics

The data was analyzed by unpaired student's T test and SPSS 20.

Results

The study consists of 100 diabetic cataract cases which were grouped into two depending on the HbA1c value as mentioned earlier.

The group A consists of 50 diabetic cataract cases in the age group 52 to 69 with mean age and standard deviation of 62.72±3.258. There was 18 males and 32 females. The group B consists of 50 diabetic cataract cases in the age group 46 to 59 with mean age and standard deviation of 55.32±3.628. There was 12 males 38 females. The P value was < 0.0001 which was highly significant. (Table)

The HbA1c of both the groups A and B were 8.054±0.7936 and 10.60±0.9273 with P value < 0.0001 which was highly significant.(Table)

The FBS of both the groups A and B were 148.36±18.823 mg/dl and 156.36±20.234 mg/dl with P value = 0.0433 which was significant.(Table)

The reference ranges of serum lipid profile were taken as Cholesterol 150-200 mg/dl, triglyceride 50-150 mg/dl, HDL 40-60 mg/dl, LDL 60-130 mg/dl and VLDL 10-50 mg/dl.

The serum cholesterol level in group B cataract cases were 203.86±32.950 mg/dl in comparison with serum cholesterol level in group A cataract 190.38±18.598 mg/dl with P value = 0.0136 which was significant.(Table 4)

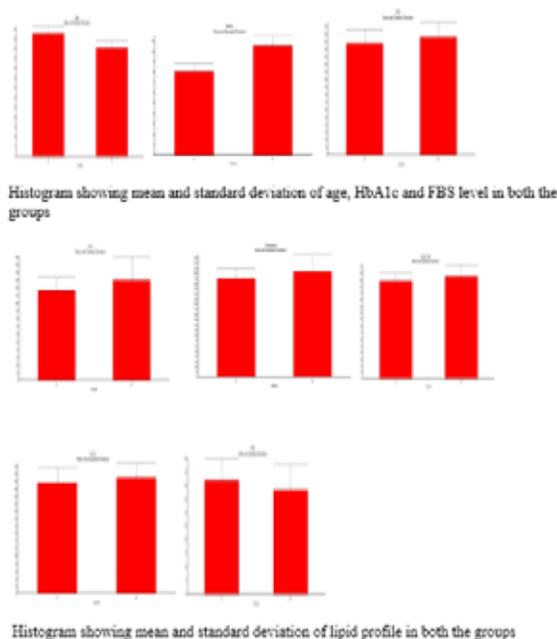
The serum triglyceride level in group B cataract cases were 155.389±17.920 mg/dl in comparison with serum triglyceride level in group A cataract cases were 149.02±11.800 mg/dl with P value = 0.0384 which was significant. (Table 4)

The serum VLDL level in group B cataract cases were 31.0178±3.689 mg/dl in comparison with serum VLDL level in group A cataract cases were 29.581±4.134 mg/dl with P value = 0.0697 which was not quite significant.(Table 4)

The serum HDL level in group B cataract cases were 38.36±9.458 mg/dl in comparison with serum HDL level in group A cataract cases were 41.97±8.007 mg/dl with P value = 0.0418 which was significant. (Table 4)

The serum LDL level in group B cataract cases were 129.97±31.230 mg/dl in comparison with serum LDL level in group A cataract cases were 116.3876±15.815 mg/dl with P value = 0.0072 which was very significant.(Table 4)

Table Comparison of mean and standard deviation of the estimated parameters in both the groups			
Parameters	Group A(n= 50)	Group B (n= 50)	P value
Age	62.72±3.258 yrs	55.32±3.258 yrs	<0.0001***
HbA1c	8.054±0.7935	10.63±0.9273	<0.0001***
FBS mg/dl	148.36±18.823	156.36±20.234	0.0433*
Cholesterol mg/dl	190.38±18.593	203.86±32.950	0.0136*
Triglyceride mg/dl	149.02±11.800	155.389±17.920	0.0418*
LDL mg/dl	116.3876±15.815	129.97±31.230	0.0072
VLDL mg/dl	29.581±4.134	31.0178±3,689	0.0697 ns
***highly significant **very significant *significant ns not significant			



Discussion

In diabetes there is increase free fatty acids in the blood due to enhanced lipolysis in adipose tissues as a result of fall in the insulin mediated inhibition of the hormone sensitive lipase. Fatty acids are esterified to form triacylglycerol. An uninhibited activity of the adipose tissue lipase increases β oxidation of fatty acid resulting increase acetyl CoA which are utilised for biosynthesis of cholesterol. This gives rise to hyperlipidemia.[14] There is difference in lipoprotein levels in type 1 and type 2 diabetes mellitus. Type1 diabetes mellitus results from a cellular-mediated autoimmune destruction of the β cells of the pancreas.[15]Lipid abnormalities in type 1 diabetes mellitus are largely related to poor glycemic control and the most common abnormality is hypertriglyceridemia.[16] Glycemic control and plasma triglyceride are correlated in type 1 diabetes mellitus.[17] The relationship is due to an inability to clear chylomicrons and very-low-density lipoprotein[18] which is secondary to a reduction in the activity of the enzyme lipoprotein lipase.[19,20] This situation is reversible with improvement in diabetic control.[21] High-density lipoprotein cholesterol (HDL-C) levels may be low when glycemic control is poor but generally are normal or perhaps high with restitution of good glycemic control.[22] Low-density lipoprotein cholesterol (LDL-C) levels are usually normal with well-controlled type 1 diabetes mellitus[23] but may be increased in the setting of poor glycemic control.[24]

Subjects with type 2 diabetes mellitus have insulin resistance and they usually have relative (rather than absolute) insulin deficiency.[25] Lipid abnormalities in patients with type 2 diabetes mellitus are twice as common as in the nondiabetic population and are more complex than those in patients with type 1 diabetes mellitus because of the interaction among obesity, insulin resistance and hyperinsulinemia, factors commonly seen with this condition.[16] The most common lipid abnormalities associated with type 2 diabetes mellitus are hypertriglyceridemia and reduced HDL-C levels.[26,27]

In our study we have found the mean and standard deviation of age, in group A to be 62.52± 3.593 in comparison to group B 55.42± 3.786 which is highly significant with a p< 0.0001.

Group A HbA1c mean and standard deviation was 8.054 ± 0.7936 in comparison to group B 10.60 ± 0.9273 which was significant with $p < 0.0001$.

FBS mean and standard deviation of group A and group B was 148.36 ± 18.823 and 156.36 ± 20.234 respectively with p value 0.0433 which was significant.

Under lipid profile, serum cholesterol mean and standard deviation of group A and group B was 190.38 ± 18.593 and 203.86 ± 32.950 respectively with p value 0.0136, which was significant.

Serum triglyceride mean and standard deviation of group A and group B was 149.02 ± 11.800 and 155.389 ± 17.920 respectively with p value 0.0384, which was significant.

Group A mean and standard deviation of serum HDL was 41.97 ± 8.007 and group B was 38.36 ± 9.458 with p value 0.0418, which was significant.

Mean and standard deviation of serum LDL in group A and group B was 116.3876 ± 15.815 and 129.97 ± 31.230 respectively with a p value 0.0072 which was very significant.

Serum VLDL mean and standard deviation of group A and group B was 29.581 ± 4.134 and 31.0178 ± 3.689 respectively with a p value 0.0697 which was not quite significant.

Several studies have been done to compare the serum lipid profile in diabetic cases but after thorough search of the available literature, we have found that no comprehensive comparative study of serum lipid profile in diabetics on basis of serum HbA1c level has been done so far. This study is an attempt on our part to analyze if any significance exists between the lipid profile and HbA1c level of serum in early development of diabetic cataract.

Conclusion

Analytical result of this study reveals that the diabetic cases with high HbA1c level and high lipid profile have early development of cataract. Therefore high lipid level can be considered as one of the causative factors of early development of cataract. Since control of glycemic level also controls the lipid level, regular estimation of HbA1c and lipid profile is advisable for diabetics to maintain a low lipid profile and thereby prevent the early development of cataract.

Though our study propose the relation of HbA1c and lipid profile in diabetics, further study is advisable to draw a conclusion in establishing relation between the elevated level of HbA1c and lipid profile as a risk factor in early development of cataract.

Conflicts of interest:- No conflict of interest is associated with this work.

Contribution of Authors :- We declare that this work was done by the authors named in this article and all liabilities pertaining to claims relating to the content of this article will be borne by the authors.

Ethical Approval

All procedures performed in studies involving human participants were in accordance with the ethical standards of the Guwahati Medical College and Hospital institutional research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

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