Research Paper Medical Science

# STUDY OF SERUM LIPID PROFILE IN TYPE 2 Diabetes MELLITUS WOMEN PATIENTS WITH AND WITHOUT DIABETIC RETINOPATHY IN AND AROUND THE BHOPAL REGION

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**ABSTRACT**

Background: Diabetes mellitus is a metabolic disorder and major health problem of all the countries Diabetic retinopathy is characterized by macular edema and frequently accompanied by lipid exudation The present study was serum lipid profile in type 2 diabetes mellitus women patient with and without diabetic retinopathy (DR) in and around Bhopal population.
Methods : 300 type 2 diabetic women patients (150 T2DM with DR and 150 T2DM without DR) from the department of Biochemistry collaborated with ophthalmology department at Gandhi Medical college, Bhopal, Madhya Pradesh were included in the study Fasting glucose Serum lipid profile (TG,TC,HDL, LDL,VLDL).
Results: Comparison of type 2 diabetes mellitus with DR and without DR age was found to be statistically significant. Anthropometric parameters between both groups BMI was found to be statistically not significant. Comparison of fasting glucose between both groups was found to be statistically significant. Lipid Profile between both groups TOTAL CHOLESTEROL, TRIGLYCERIDE, LDL & VLDL was found to be statistically significant ($P<0.001$) . Only HDL was found to be statistically not significant
Conclusion : It can be concluded from the result that the role of raised total cholesterol, triglyceride, HDL and not LDL, VLDL in the incidence of retinopathy in type II diabetes mellitus women patients

**KEYWORDS** Type 2 diabetes mellitus, Diabetic retinopathy, Lipid Profile, Bhopal population

**INTRODUCTION :**

Diabetes mellitus is a metabolic disorder and major health problem of all the countries. Low and middle income countries face the greatest burden of the disease. The total number of people with diabetes is projected to rise from 171 million in the year 2000 to 200 million in the year 2013 and to 366 million in the year 2030 **(Wilds., 2012)[1].** Risk factors like duration of diabetes, glycemic control (HbA1c), systolic blood pressure, dyslipedemias, smoking and microalbuminurias have been linked with complications of DM.

Diabetic retinopathy is characterized by macular edema and frequently accompanied by lipid exudation. High lipid levels are known to cause endothelial dysfunction due to a reduced bioavailability of nitric oxide and this endothelial dysfunction was suggested to play a role in retinal exudate formation in DR[2]. Consequently, it was proposed that, hyperlipidemia might contribute to DR and macular edema (ME) by endothelial dysfunction and breakdown of the blood retinal barrier leading to exudation of serum lipids and lipoproteins[3]. The most common specific complication of type 2 diabetes mellitus is the blindness. In a population based study in South India, diabetic retinopathy was detected in 1.78% of the patients screened and was projected to become a significant cause of blindness in the coming decade. Blindness may be due to non resolving vitreous hemorrhage, fractional retinal detachment and diabetic macular edema[4].

The association between diabetes mellitus and hypomagnesemia is compelling for its wide ranging impact on diabetic control and complications. Magnesium depletion has been linked to the development of retinopathy[5,6].

Microalbuminuria is associated with diabetic retinopathy in type 2 Diabetes mellitus therefore, it is a reliable marker of retinopathy[7]. A study on lipoprotein subclasses by Lyons et al[8] 2004 using Nuclear Magnetic Resonance (NMR) has revealed that more severe diabetic retinopathy was associated with a shift in LDL particle size distribution from large to small. New clinical practice recommendations from the American Diabetes Association advocate the use of HbA1C in the diagnosis of diabetes, largely on the basis of the established association between HbA1C and microvascular disease[9].

No previous study investigated Lipid profile in type 2 diabetes women with and without diabetic retinopathy in the central India. Therefore, the present study is the first to lipid profile among type 2 diabetic women with diabetic retinopathy in the Bhopal population.

**MATERIALS AND METHODS:**

The present study is a case-control study conducted at the department of biochemistry collaborated with ophthalmology department at Gandhi Medical college Bhopal, (M.P) with 300 women patients (150 T2DM with Diabetic retinopathy patients and 150 T2DM without Diabetic retinopathy patients). All the subject were diagnosed to have type II diabetic mellitus according to American Diabetes Association. Consent was taken from all the patients. The patients were in the age group of 20 to 60 years. Information including age, body mass index (BMI), Fasting glucose, Lipid profile. Retinopathy was assessed by direct and indirect ophthalmoscopy. Fundus photography.

**EXCLUSION CRITERIA:-**

- Patients aged less than 20 and more than 60 years.
- Pregnant women and women under hormonal therapy.
- Type 1 diabetic patients.
- Males.

**INCLUSION CRITERIA:-**

- Diabetic patients with- and without retinopathy.
- Patients aged 20 to 60 years

Blood samples were collected from 300 type 2 diabetic patients. Fasting overnight venous blood sample (about 6 ml) were drawn by a certified phlebotomist into vacutainer plane tubes and serum separator tube and ethylenediaminetetraacetic acid (EDTA) tubes from all individuals.

Body mass index was calculated as the ratio of body weight in Kg/height in square meter. Fasting serum glucose was measured by glucose kit GOD/POD, using the enzymatic method, which is based on the enzymatic oxidation of glucose by glucose oxidase. Total Cholesterol (TC) by CHOD – POD enzymatic method of Biolabo kit depends on enzymatic method of Richmond and Allain et al. Serum Triglyceride (TG )was measured by Biolabo kit which depends on the GPO- POD enzymatic method of Fossati and Principe. HDL-C estimation was done by the Biolabo kit which depends on the enzymatic method of Burestien et al. LDL-C determination was made according to Friedwald equation, LDL = Total cholesterol – HDL-C – (TG/5). TG/5=VLDL.

The statistical analysis were performed SPSS for windows version 20 program. All data were reported as mean ± standard deviation (SD). So, independent sample 't' test was used for comparison of variables between the groups. Statistical significance was defined as p<0.05.

**RESULT:**

**Table No:1 shows that comparison of age between both groups (T2DM with DR, T2DM without DR) was found to be statistically significant (P<0.001) using independent sample 't' test.**

| | T2DM with DR (n=150) | T2DM without DR (n=150) | t | P |
|---|---|---|---|---|
| | **Mean ± SD** | **Mean ± SD** | | |
| AGE | 32.05 ± 5.818 | 43.34 ± 7.919 | -14.317 | .000* |

***Statistically significant (P<0.001)**

**TABLE NO : 1 COMPARISON OF AGE BETWEEN T2DM WITH DR AND T2DM WITHOUT DR**

**Table No: 2 shows that comparison of anthropometric parameters between both groups BMI was found to be statistically not significant (P>0.005) using independent sample 't' test.**

| **ANTHROPOMETRIC PARAMETER** | T2DM with DR (n=150) | T2DM without DR (n=150) | t | P |
|---|---|---|---|---|
| | **Mean ± SD** | **Mean ± SD** | | |
| BMI (Kg/m$^2$) | 25.72 ± 2.21 | 25.20 ± 2.35 | 1.219 | .224# |

***Statistically significant (P<0.001), # Non significant (p>0.005)**

**TABLE NO : 2 COMPARISON OF BMI BETWEEN T2DM WITH DR AND T2DM WITHOUT DR**

**Table No: 3 shows that comparison of fasting glucose between both groups was found to be statistically significant (P<0.001) using independent sample 't' test.**

| **FASTING GLUCOSE** | T2DM with DR (n=150) | T2DM without DR (n=150) | t | P |
|---|---|---|---|---|
| | **Mean ± SD** | **Mean ± SD** | | |
| FASTING GLUCOSE (mg/dl) | 138 ± 17 | 169 ± 34 | -12.622 | .000* |

***Statistically significant (P<0.001), # Non significant (p>0.005)**

TABLE NO : 3 COMPARISON OF FASTING GLUCOSE BETWEEN T2DM WITH DR AND T2DM WITHOUT DR.

**Table No: 4 shows that comparison of Lipid Profile between both groups TOTAL CHOLESTEROL, TRIGLYCERIDE, LDL & VLDL was found to be statistically significant (P<0.001) .** Only HDL was found to be statistically not significant (P>0.005) using independent sample 't' test.

| LIPID PROFILE | T2DM with DR (n=150) | T2DM without DR (n=150) | t | P |
|---|---|---|---|---|
| | **Mean ± SD** | **Mean ± SD** | | |
| TOTAL CHOLESTEROL (mg/dl) | 190 ± 19 | 175 ± 29 | 3.259 | .001* |
| TRIGLYCERIDE (mg/dl) | 188 ± 17 | 170 ± 35 | 5.151 | .000* |
| HDL (mg/dl) | 39 ± 3 | 40 ± 6 | .835 | .405# |
| LDL (mg/dl) | 110.9 ± 18.1 | 104.4 ± 26.3 | 2.124 | .034* |
| VLDL (mg/dl) | 36.5 ± 3.4 | 33.2 ± 7.1 | 5.101 | .000* |

***Statistically significant (P<0.001), # Non significant (p>0.005).**

**TABLE NO : 4 COMPARISON OF LIPID PROFILE BETWEEN T2DM WITH DR AND T2DM WITHOUT DR**

**DISSCUSION :**

Dyslipidemia is an abnormal amount of lipids in the blood. T2DM with diabetic retinopathy is found to be associated with lipid disorders, characterized by normal or slightly elevated total cholesterol, increased LDL and lower HDL. However few studies have reported a significant increase in total cholesterol (TC) and low density lipoprotein cholesterol LDL-C levels in patients with T2DM with retinopathy patients.

The current study shows that fasting glucose of the study population. The mean fasting glucose of T2DM without DR was significantly higher than that in T2DM with DR Therefore, age was found to be statistically significant. Jayalakshmi et al[10] reported that increased serum fasting blood glucose levels in diabetics with & without retinopathy when compared with controls. This increase is statistically significant with p < 0.01. Similar observation is given by others namely Tien Yin Wong et al[11].

The present study shows that mean total cholesterol and triglyceride (mg/dl) of T2DM with DR was significantly higher than that in T2DM without DR Therefore, total cholesterol and triglyceride was found to be statistically significant. Alpana Mathur et al[12] found that TC, LDL and TG levels were significantly higher (p<0.0001) in diabetic subjects as compared to the control group. This is due to the increased flow of glucose and fatty acids to liver due to lack of insulin. Decreased clearance of LDL and TG is due to over production of apolipoprotein B and low lipoprotein lipase activity. Studies carried out with type 2 diabetic patients having diabetic retinopathy have reported significantly elevated concentrations of total cholesterol[13,14]. On the contrary, other studies showed that the mean levels of lipids were not significantly different in patients with diabetic retinopathy[15,16].

In this study mean LDL-Cholesterol of T2DM with DR was significantly higher than that in T2DM without DR Therefore, LDL-Cholesterol was found to be statistically significant. In ETDRS it was shown that patients with high total cholesterol and LDL levels were more likely to have retinal hard exudates compared to patients with normal lipid profile[17]. Similar observation of no change in the values with respect to LDL was seen in study done by Tien Yin Wong et al[11], However, some others observed increased levels of LDL when compared between 3 such groups[18]. Sachdev & Sahni (2010)[19] proved that cholesterol and LDL are risk factors for retinal hard exudates in Type II DM in North Indian population.

There was no significant difference in the mean HDL-cholesterol of T2DM with DR compared to T2DM without DR Therefore, HDL-Cholesterol was found to be statistically non significant. Hove et al[20] (2004) found no association between

TG, TC and HDL with diabetic retinopathy. Similarly, Chennai Urban Rural Epidemiology Study showed that mean non HDL levels were higher in patients with DR compared to those without DR[21]. Jayalakshmi et al[10] reported that significant decrease of HDL levels in diabetic retinopathy and in diabetes mellitus without retinopathy as compared to normals, which was statically significant [p < 0.01].The mean VLDL-Cholesterol of T2DM with PCOS was significantly higher than that in T2DM Therefore, VLDL-Cheolesterol was found to be statistically significant. Consequently the plasma levels of VLDL, chylomicrons and triglycerides are increased and hypercholesterolemia is also frequently seen in diabetics[22].

**CONCLUSION :**

The study suggest that role of raised total cholesterol, triglyceride, HDL and not LDL, VLDL in the incidence of retinopathy in type II diabetes mellitus women patients. Hypercholesterolemia is significantly associated with progression of DR. The present study suggest fasting glucose with dislipidemia increase the risk for development of retinopathy.

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