

## A Correlation between Dyslipidaemia and Glycaemic Control in Type 2 Diabetic Patients

Dr.Dinesh Parmar\*, Dr.Kirit Sakariya\*\*\*, Dr.Kalpesh Vidja\*\*, Dr.Neeta Mehta\*\*\*\*, Dr.Manish Kakaiya\*\*\*

\*Resident, \*\*Tutor, \*\*\*Assistant Professor, \*\*\*\*Professor and Head, Department of Physiology, PDU Medical College, Rajkot

**Abstracts:** Background: Diabetes is global endemic with rapidly increasing prevalence in both developing and developed countries. There is a high risk of cardiovascular diseases in people with type 2 diabetes, while Abnormal lipid profiles and lipoprotein oxidation (especially LDL-C) are more common in diabetics and are aggravated with poor glycaemic control. The aim of the present study is to assess the glycaemic control status by HbA1c estimation and to compare the lipid profile in type 2 diabetes patients with good glycaemic control (HbA1c $\leq$ 8) & those with poor glycaemic control (HbA1c $>$ 8). Materials and methods: The present study was conducted on 100 type-2 diabetic males aged 40-60 years. Among them 48 patients having HbA1c level  $\leq$ 8% were categorized as having good glycaemic control (group-1) and 52 patients with HbA1c  $>$ 8% were categorized as having poor glycaemic control (group-2). Result: A significant increase in S.cholesterol(254.46 $\pm$ 45.54), s.LDL(162.57 $\pm$ 39.79), S.VLDL(45.98 $\pm$ 14.69) and S.triglycerides (225.  $\pm$ 76.61) in group-2 patients (P $\leq$ 0.05) were noticed as compare to group-1 patients. Our findings suggest positive association between dyslipidemia and glycemic control on the basis of screening with the HbA1c level. Raised triglyceride and LDL levels are established risk factors for coronary artery diseases. Conclusion: The optimal care of diabetic patients should also include periodic screening for lipid abnormalities and periodic measurement of HbA1C for glycaemic control. [ Parmar D et al NJIRM 2012; 3(1) : 46-48]

**Key Words:** dyslipidaemia, type-2 diabetics, glycaemic control, HbA1c level

**Author for correspondence:** Dr.Kirit Sakariya, Assistant Professor in Physiology, PDU Medical College, Rajkot  
Email: kiritsakariya2002@gmail.com

**Introduction:** Diabetes is global endemic with rapidly increasing prevalence in both developing and developed countries<sup>1</sup>. There is a high risk of cardiovascular diseases in people with type 2 diabetes, while cardiovascular death is top killer in this population. One important cardiovascular risk factor in type 2 diabetic people is dyslipidemia. This is characterized by low HDL-cholesterol, high serum VLDL-triglycerides, and a preponderance of small, dense LDL. Even slight elevations of LDL-cholesterol in type 2 diabetic patients are associated with a substantial increase in cardiovascular risk<sup>2</sup>. This means in turn that normal lipid concentrations are more atherogenic in diabetic than in non-diabetic patients.

The mechanism of formation of dyslipidemia in type 2 diabetes remains uncertain, even though many factors are involved including insulin resistance, hyperinsulinemia, disturbed fatty acid metabolism and even hyperglycemia. The composition and amount of the different lipoproteins are altered<sup>3</sup>. India leads the world with largest number of diabetic subjects. According to the Diabetes Atlas 2006 published by the International Diabetes Federation, the number of people with diabetes in

India currently around 40.9 million is expected to rise to 69.9 million by 2025 unless urgent preventive steps are taken. There are more than 154 million diabetic's worldwide<sup>5</sup>. Certain racial and ethnic groups have a greater risk of developing diabetes<sup>6</sup>.

Hyperglycemia is the apparent feature of diabetes, however most of them carry unnoticed dyslipidemia. The most common pattern of dyslipidemia in type 2 diabetic patients is elevated triglyceride levels and decreased HDL cholesterol levels<sup>7</sup>. Diabetic patients may have elevated levels of non-HDL cholesterol (LDL plus VLDL). However, type 2 diabetic patients typically have a preponderance of smaller, denser LDL particles, which *possibly increases atherogenicity*. Elevated levels of triacylglycerols (TG), cholesterol, and low density lipoprotein-cholesterol (LDLC) are documented as risk factors for atherogenesis<sup>8</sup>.

Abnormal lipid profiles and lipoprotein oxidation (especially LDL-C) are more common in diabetics and are aggravated with poor glycaemic control. Good metabolic control of hyperglycemia may prevent the alteration of lipid peroxidation and lipid

metabolism which help in good prognosis and preventing manifestation of vascular and systemic complication of diabetes mellitus. In the present study an attempt is made to study pattern of dyslipidemia in diabetic, and effect of glycemic control on dyslipidemic patterns.

**Material and Methods:** The study was conducted in biochemistry department in PDU Medical college Rajkot. The study was conducted on 100 type- 2 diabetic male patients with permission from Institutional Ethics committee. All our subjects were 40 to 60 years male patients. They were all non smokers, normotensives, with moderate built and moderately active life style. Those with history of alcoholism, renal disorders, endocrine disorders and those on lipid lowering drugs and beta blockers were excluded from the study.

After eliciting history, detailed physical and systemic examination anthropometric measurements were done. Blood samples were collected in fasting state. 10ml Blood was drawn by disposable syringe and blood was transferred in plain, EDTA and fluoride bulb blood were stored at 4°C. Then clear fresh serum with no haemolysis was separated by centrifugation at 3000rpm for 10 minutes at room temperature for further biochemical tests.

Fasting total cholesterol, triglycerides and HDL was tested by "End point Biochemistry" method<sup>9</sup>. The serum LDL cholesterol concentration was calculated from the serum concentrations of total cholesterol, HDL cholesterol and triglycerides using the formula,  $LDL-C = TC - (HDL-C+TG/5)(mg/dl)$ . The VLDL cholesterol concentration was calculated from the values of TG (as TG/5).

Fasting blood glucose by God- Pod method. ( Normal level: 70-110 mg/dl). HbA1C by ion exchange resin method (Normal:  $\leq 8\%$ ). Post prandial blood glucose (PP2BS). (Normal level: < 140 mg/dl). Blood samples were collected 2 hours after meal. All the results were expressed as mean $\pm$ SD. Unpair student t test was applied for comparison of data and  $P < 0.001$  considered as the level of significance.

Our group were decided by the level of HbA1C in 100 patients. Among them 48 patients having

HbA1c level  $\leq 8\%$  termed as having good glycaemic control and 52 patients with HbA1c  $> 8\%$  are termed as having poor glycaemic control.

**Result:** In our study table-1 is showing mean age for group 1 is 48years and for group 2 is 51.4 years. duration of type2 diabetes mellitus in group 1 is 5years and for group 2 is 8.64 years. The impact of glycaemic control on lipid profile was evaluated by categorizing all the patients into 2 groups on the basis of HbA1c levels: group 1, good glycaemic control (HbA1c $\leq 8$ ); group 2, poor glycaemic control. (HbA1c  $> 8$ ) The level of cholesterol was significantly higher in those with poor control as compared to those with good control. Also poor control group have significantly higher TG, LDL and VLDL levels as compared to those in good control group. There was no significant correlation for HDL between two groups.

**Table- 1: Showing Comparison of lipid profiles in good and poor glycaemic status**

HbA1C	Group-1 $\leq 8$ (good) N=48	Group-2 $> 8$ (poor) N=52	p-value
Age	48.15 $\pm$ 5.34	51.4 $\pm$ 5.31	
Duration of Type-2 diabetes	5 $\pm$ 2.58	8.64 $\pm$ 3.31	
S. CHOLESTEROL	177.36 $\pm$ 40.49	254.46 $\pm$ 45.54	0.000*
S.TG	161.87 $\pm$ 66.15	225. $\pm$ 76.61	0.000*
LDL	105.42 $\pm$ 36.51	162.57 $\pm$ 39.79	0.000*
HDL	46.23 $\pm$ 7.49	44.57 $\pm$ 7.45	0.2697
VLDL	32.42 $\pm$ 13.18	45.98 $\pm$ 14.69	0.000*

**Discussion:** Our findings strongly supported by H.A. Khan et al<sup>10</sup> they observed a linear relationship between HbA1c and dyslipidaemia. The levels of serum cholesterol and TG were significantly higher and of HDL significantly lower in patients with worse glycaemic control as compared to patients with good glycaemic control. No significant difference was observed with regard to glycaemic control and LDL. The findings of this study clearly indicate that HbA1c is not only useful biomarker of long-term glycaemic control but also a good predictor of lipid profile. Thus monitoring of glycaemic control using HbA1c could have additional benefits of identifying diabetic patients who are at a greater risk of cardiovascular complications.

Waqar Ahmed<sup>11</sup> observed in 100 diabetics that 42 patients had good glycaemic control and 58 had poor control. 43 patients had abnormal lipid profiles. Serum total cholesterol and triglycerides were lower and HDL levels higher in the good control group but serum LDL levels were equal.

Muhammad Saiedullah et al<sup>12</sup> observed significant correlation of HbA1c with cholesterol and LDL between controlled and uncontrolled diabetic subjects. Syed S. et al observed on 120 DM patients that poor glycaemic control (raised HbA1c levels) was positively related with total cholesterol (and LDL-C levels and negatively related with HDL-C<sup>13</sup>

**Conclusion:** Our study indicates prevalence of lipid disorders in patients with type-2 diabetes. It shows the borderline increase in serum Cholesterol, LDL-C and TG levels in all type 2 diabetics. The serum Cholesterol, TG, LDL-C and VLDL-C levels were significantly higher in patients with poor glycaemic control (HbA1c >8). The patients with poor glycaemic control are at borderline to high cardiovascular risk status as determined by TG and LDL-C levels. It may postulated from our study that a positive association between dyslipidemia and glycaemic control on the basis of screening with the HbA1c level. Raised triglyceride and LDL levels are established risk factors for coronary artery diseases.

**Recommendation:** For fair glycaemic controls we require reducing the weight, more physical exercise and anti diabetic drugs are the necessary steps. Again for optimal care of diabetic patients we should also include, periodic screening for lipid abnormalities and periodic measurement of HbA1C for glycaemic control. The lipid lowering drugs may also be considered for achieving effective lipid control.

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