

## A Study of Lipid Profile in Type 2 Diabetic Punjabi Population

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### Abstract

*Aims:* The purpose of the study was to observe the lipid profile of type 2 diabetics in the male Punjabi population. *Method(s):* A total of 120 Type 2 diabetic men with an age range from 30 to 70 years volunteered to participate in this study. The fasting blood sugar (FBS) & lipid profiles were recorded with standard procedure. *Results:* The mean age and FBS were  $50.3 \pm 11.8$  years and  $135.1 \pm 27.4$  mg/dl respectively. There were 59% subjects with high total cholesterol (TC) levels and 98% were having increased LDL levels. 89% of the subjects were found with lower HDL level. *Conclusion:* It is concluded from the results of the present study that in type 2 diabetics dyslipidaemia was very common especially raised LDL levels. Results strongly suggest that further investigations should relate the effects of dyslipidaemia and abnormalities of insulin resistance in type 2 diabetics. And ethnic specific patterns of lipid profile in type 2 diabetics regardless of their glucose levels, suggests that ethnic-specific strategies and guidelines on risk assessment and prevention of CVD due to dyslipidemia are required.

**Keywords: CVD, FBS, Dyslipidaemia.**

### Introduction

Dyslipidemia is one of the major cardiovascular disease (CVD) risk factors and plays an important role in the progress of atherosclerosis, the underlying pathology of CVD. The prevalence of dyslipidemia in type 2 diabetes is double with respect to the general population (Haffner, 1998). These are more complex abnormalities that are caused by the interrelation among obesity, insulin resistance and hyperinsulinism (Burstein *et al.*, 1970 & American Diabetes Association, 1998). According to Freedman *et al* (1999), when the overweight subjects were compared with their respective thinner counterparts, they presented 2.4 to 7.1 times higher probability to have an elevated total

cholesterol, LDL cholesterol, triglycerides and blood pressure as well as 12.6 times higher probability to have hyperinsulinemia. It is worth to emphasize that the fatty tissue is exclusively related to risk factors, such as the altered insulin and lipid profile, which can contribute to the development of the insulin resistance syndrome, which comprises several risk factors for the emergence of cardiovascular complications (Gower, 1999). In patients with type 2 diabetes, which is equivalent to CHD (Juutilainen *et al*, 2005), it is most commonly characterized by elevated TG and reduced HDL-C (Goldberg 2001). These abnormalities can be present alone or in combination with other metabolic disorders. The prevalence of dyslipidaemia varies depending on the

population studied, geographic location, socioeconomic development and the definition used (Wood *et al*, 1972; Berrios *et al*, 1997). Very few cross-sectional studies have evaluated the relationship between lipid and blood glucose concentrations in type 2 diabetics in Punjabi population. The present study was planned to identify the prevalence of abnormalities in lipid profile among type 2 diabetic Punjabi population.

### Materials and Methods

One hundred and twenty type 2 diabetic male patients belonging to Patiala district of Punjab were selected as subjects after obtaining their informed written consent and their age ranged from 30-70 years. The objectives of the present study were thoroughly explained to them. Clinical history was also documented and following exclusion criteria were used- not taken any steroid therapy in past 3 months, any liver, kidney or cardiac failure, neoplasm and patients who were on any type of anti-lipidemic therapy. The study protocol was reviewed and approved by the Ethics Committee of Punjabi University, Patiala. The serum was separated immediately after obtaining the blood sample (overnight fasting) by using centrifugation for 10 minutes. Fasting blood glucose concentration and Lipid Profile [Total Cholesterol (TC), HDL, VLDL & Triglycerides (TG)] were measured using Blood Analyzer. The appropriate chemical testing kits were used. LDL was calculated by using Friedewald formula:  $LDL = TC - (TG/5) - HDL$ . For the descriptive and inferential statistics SPSS version 16 was used.

### Results & Discussion

Table 1 shows the mean values of age and fasting blood sugar were

observed to be  $50.3 \pm 11.8$  years and  $135.1 \pm 27.4$  mg/dl respectively. Results of the BMI in the present study indicate that our subjects were not obese but their mean fasting blood sugar level was more than the normal value.

**Table 1. Mean±SD of Age & FBS of Type 2 diabetics**

Variables	Mean ± SD
Age (years)	50.3 ± 11.8
FBS(mg/dl)	135.1 ± 27.4

Table 2 shows the quantitative analysis of lipid profile of Type 2 diabetics and found that the mean total cholesterol ( $203.9 \pm 15.8$  mg/dl), triglycerides ( $151.1 \pm 17.7$  mg/dl), HDL ( $47.7 \pm 6.2$  mg/dl), LDL ( $124.4 \pm 11.9$  mg/dl), VLDL ( $32.3 \pm 7.1$  mg/dl) & LDL / HDL ratio ( $2.63 \pm .37$ ).

**Table 2. Mean±SD of lipid profile of Type 2 diabetics**

Variables	Mean ± SD
Total Cholesterol,TC (mg/dl)	203.9±15.8
Triglycerides, TAG (mg/dl)	151.1± 17.7
HDL-C (mg/dl)	47.7±6.2
LDL-C (mg/dl)	124.4± 11.9
VLDL (mg/dl)	32.3 ± 7.1
Ratio of LDL / HDL	2.63±0.37

TC- total cholesterol, HDL- high density lipoproteins, LDL-low density lipoproteins, VLDL- very low density lipoproteins, TG- triglycerides

The present study also analyzed the prevalence rate of hypercholesterolemia, hypertriglyceridemia, low HDL and high low density lipoproteinaemia among type 2 diabetics. It was found that 59% Type 2 diabetics in this study had hypercholesterolemia, 53% Hypertriglyceridemia and 98% abnormal LDL levels. In 89% of Type 2 diabetics, the HDL was less than 40 mg/dl. Thus, the results of the present study shows that in Type 2 diabetics the dyslipidaemia is the most common abnormality and it was found in the level of LDL-C value.

### Discussion

For the interpretation of serum lipid reference values, the guidelines of National Cholesterol Education Programme (NCEP) Adult Treatment Panel III (ATP III) were followed. According to NCEP-ATPIII guidelines, hypercholesterolemia is defined as TC > 200 mg/dl, high LDL-C when value > 100 mg/dl, hypertriglyceridemia as TAG > 150 mg/dl and low HDL-C when value is < 40 mg/dl. Dyslipidemia was defined by presence of one or more than one abnormal serum lipid concentration (Menik *et al.*, 2005).

The results of the present study were in agreement with the previous research reports that dyslipidemia, overweight and obesity is a common association with type 2 diabetic patients (Haffner, 1998 and American Diabetes Association, 1998). In the present study 59% of the subjects had hypercholesterolemia and 98% abnormal LDL levels. Type of dyslipidaemia reported among diabetic population is numerous in different places in world indicating that dyslipidemia can be influenced by the interaction of genetic and environmental factors (Carlos *et al.*, 2001). The prevalence of the lipid abnormalities reported by Mexican nationwide survey done by Carlos *et al.* (2001) is similar to that observed in Turkish (Mahley *et al.*, 1995) and other Asian populations, including Bangladeshi and Pakistani populations (Bhopal *et al.*, 1999). Their study shows that 53% of the diabetic population had Hypertriglyceridemia. The present study is in agreement with the above report in relation to prevalence rates of hypertriglyceridemia among type 2 diabetic Punjabi population (53% in the present investigation and 54% in Mexican nationwide survey). It was also found that

98% of Type 2 diabetics had high LDL levels and 59% showed hypercholesterolemia. This observation further confirms that patients with Type 2 diabetes had co-incidence of several abnormal lipid profiles. It further confirms that dyslipidemia could have impact on the development of insulin resistance in type 2 diabetes mellitus. Menik *et al.* (2005) reported a significant genetic association between development of insulin resistance and dyslipidemia among type 2 diabetic patients.

### Conclusion

It is concluded from the results of the present study that type 2 diabetics were either overweight or type I obese and dyslipidaemia was very common. Results strongly suggest that further investigations should relate the effects of dyslipidaemia and abnormalities of insulin resistance in type 2 diabetics. And ethnic specific patterns of lipid profile in type 2 diabetics regardless of their glucose levels, suggesting that ethnic-specific strategies and guidelines on risk assessment and prevention of CVD due to dyslipidemia are required.

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