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# STUDY ON THE PREVALENCE OF DYSLIPIDEMIA IN TYPE 2 DIABETES MELLITUS A PROSPECTIVE STUDY IN PATIENTS FROM CENTRAL INDIA

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## ABSTRACT

**Background:** Diabetes mellitus is a common health problem globally. Dyslipidaemia is a major risk factor to developcardiovascular disease in diabetics. The present study was undertaken to find out the prevalence of dyslipidaemia in type 2 diabetic patients. **Methods:** The present study was a cross sectional study consisting of 92 (46 male and 46 female) known type 2 diabetes mellitus patients. Age, gender, duration of diabetes, body mass index (BMI) was recorded in all the diabetic patients. Fasting blood glucose levels, total cholesterol, triglycerides, HDL, LDL, VLDL levels were measured using standard methods and recorded. **Results:** The average total cholesterol, triglycerides, LDL, HDL and VLDL were 200±41mg/dl, 169.62±88.79mg/dl, 132.45±36.36mg/dl,39.1±16.4mg/dl and 35.85±17.09mg/dl respectively. The incidence of occurrence of hypercholesterolemia was 58.6% and hypertriglyceridemia 36.9%. Increased levels of LDL were observed in 60 (65.2%) patients and reduced HDL was observed in 86 (93.4%) patients. The incidence rate of dyslipidaemia was higher in female diabetic patients when compared to male diabetic patients. **Conclusions:** Awareness of dyslipidaemia and its risk should be considered in all the type 2 diabetic patients as these are more prone to develope cardiovascular disease The lipid profile should be monitored regularly along with blood glucose levels in such patients

**KEYWORDS:** Diabetes mellitus, Dyslipidaemia, Hypercholesterolemia, Lipid profile.

## INTRODUCTION

Diabetes mellitus is an endocrine disorder which is characterized by metabolic abnormalities with micro and macrovascular complications which cause significant morbidity and mortality.[1,2] India is one of the rapidly developing country standing in second highest diabetes prevalence in the world which could be due to rapid urbanization that brought along with it a sedentary lifestyle is an important factor inducing diabetes mellitus.[1-3] According to a study in 2011, the estimated number of patients with diabetes in India was 62.4.

million which is projected to rise to a staggering 101.2 million by 2030.[4] Diabetes mellitus is an important risk factor for cardiovascular disease and atherosclerosis as it is a common secondary cause of hyperlipidemia when the glycemic control is poor.[5] The prevalence of dyslipidemia in type 2 diabetes is double with respect to the general population.[6] Approximately 80% of deaths in patients with diabetes are prone to coronary vascular diseases and the Asian Indians have high risk of coronary heart diseasethan whites.[7]

In type 2 diabetes, because of the insulin resistance the intracellular hormone-sensitive lipase gets activated and increases the release of non-esterified fatty acids (NEFA) from triglycerides stored in adipose tissue. Higher concentrations of circulating NEFA increases hepatic triglyceride production which leads to increased hepatic triglyceride synthesis. The enzyme lipoprotein lipase which is located on vascular endothelium determines the rate of removal of triglycerides from the circulation. In contrast to intracellular hormone-sensitive lipase this lipoprotein lipase may be down regulated in states of insulin resistance or deficiency which contributes to postprandial lipemia.[8] Dyslipidemia in diabetes mellitus refers to raised low-density lipoprotein cholesterol (LDL-C), decreased high-density lipoprotein cholesterol (HDL- C) levels, or elevated triglyceride (TG) levels.[9] The present study was aimed to find out the incidence of dyslipidemia in type 2 diabetic patients as it is a major risk factor for coronary heart disease.

## METHODS

The present study was a cross sectional study conducted by the department of General Medicine at Dr RML Institute of medical Sciences,Lucknow, India from Aug2017 to July 2019 on 92 diabetic patients in which 46 were males and 46 were females. All the patients were selected randomly in both outpatient and inpatient wards. All the patients were explained about the study and the informed consent was obtained. Age, duration of diabetes, height, weight, and body mass index were recorded in all the patients.

### Inclusion criteria

Patients with type 2 diabetes mellitus with the duration of more than 3 years were included in the study.

### Exclusion criteria

The patients with type 2 diabetes mellitus with conditions altering the lipid levels and the patients suffering from coronary artery disease (CAD), cerebrovascular accident (CVA), having past history of CAD or CVA and the patients already taking for lipid lowering drugs were excluded from the study.

All the patients were instructed for at least 12 hours overnight fasting and the 5ml of venous blood was collected before breakfast for the fasting blood glucose and the serum lipid profile. After collecting the blood from the patients, 3ml of blood was transferred into serum tubes for lipid profile and 2ml of blood was transferred into sodium fluoride tubes for blood glucose estimation.

The blood glucose estimation was done by GOD-POD method. To evaluate the dyslipidemia the serum total cholesterol, triglycerides and HDL levels were measured using CHODPOD method, GOD-Pod method, CHOD-POD methods respectively. LDL was calculated by total cholesterol-HDL-serum triglyceride/5 and VLDL cholesterol was calculated by plasma triglycerides by 5.

### Statistical analysis

The mean and standard deviations were calculated for FBS, TC, triglycerides, HDL, and LDL in both males and females separately. The guidelines of national cholesterol education programme (NCEP) and adult treatment panel III (ATP III) were followed for the interpretation of serum lipid reference values. NCEP-ATPIII guidelines defines hypercholesterolemia as TC>200mg/dl, high LDL-C when value>100mg/dl, hypertriglyceridemia as TAG >150mg/dl and low HDL-C when value is <40mg/dl in male and< 50 mg/dl in female,[10] Percentage wise variation in the incidence of dyslipidemia in the male and female diabetic patients was noted.

## RESULTS

The average age of the participants was 53.2±9.16 years. The average fasting blood glucose was noted as 172.28±42.62mg/dl. The average total cholesterol, triglycerides, LDL, HDL and VLDL were 200±42 mg/dl, 169.62±89.79mg/dl, 132.45±36.38mg/dl, 39.1±16.6mg/dland 35.85±17.09 mg/dl respectively.

In the present study all the participants were having dyslipidemia as one or two parameters of the lipid profile were outside the target recommended by the guidelines ofnational cholesterol education programmed. Out of 92 diabetic patients, 54 (58.6%) were having hypercholesterolemia, 34 (36.9%) patients were having hypertriglyceridemia, 60 (65.2%) patients were having increased LDL levels, and 86 (93.4%) patients were having reduced HDL levels.

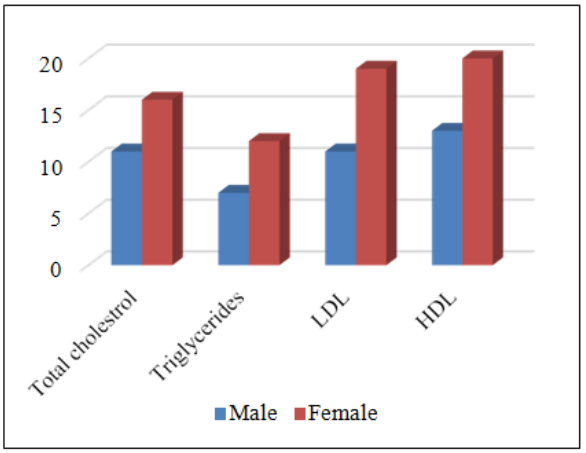


**Figure 1: Variation in the incidence of dyslipidemia inthe male and females diabetic patients.**

Out of 46 females, 32(69.5%) patients were having hypercholesterolemia,24 (52.1%) patients were having hypertriglyceridemia,38 (82.6%) patients were having increased LDL and 40 (86.9%) patients were having reduced HDL. Out of 46 males, 22 (47.8%) patients were having hypercholesterolemia,14 (30.4%) were having hypertriglyceridemia, 22 (47.8%) patients were having high LDL levels and 26 (56.5%) were having reduced HDL. Incidence was observed to be very high in female diabetic patients when compared to male diabetic patients(Figure 1).

## DISCUSSION

In the present study, most of the patients had mixed dyslipidemia with more than one lipid abnormality which was 85.7%. The prevalence of dyslipidemia in the present study was found as 86.9% which was coinciding with other studies done by Kolhar U et al, Pandya H et al, Tagoe DN et al, and Jayarama N et al, which showed prevalence of 90%, 85%, 93%, and 91% respectively.[5,11]

Insulin resistance, relative insulin deficiency and obesity are found to be associated with dyslipidemia in type 2 diabetes mellitus.[9] In the present study the hypercholesterolemia was reported as 58.6%, hypertriglyceridemia was 36.9%, increased LDL was

65.2% and lower HDL was 93.4%. In a study by Singh G et al, found the incidence of dyslipidemia as 59% of type 2 diabetics had hypercholesterolemia, 53% had hypertriglyceridemia, 98% had abnormal LDL levels and 89% had the HDL less than 40 mg/dl. Incidence of hypercholesterolemia and lower HDL were similar with the present study results, but the incidence of increased LDL was too high when compared with the present study.[14] In another study by Bali K et al, the incidence of dyslipidemia in type 2 diabetic patients of Punjab population was reported as 81.8% and hypercholesterolemia as 36.5%, hypertriglyceridemia as 57.2%, high LDL levels as 59.3% and low HDL as 34.4%patients where the hypertriglyceride incidence was high and reduced HDL incidence was very less compared to the present study.[15]

The incidence of coronary artery disease in women is lower compared to men, but it rises steadily after fifth decade. The relative risk of hypercholesterolemia is lowerin women compared to men at the young age, but after menopause the total cholesterol, LDL raises by 10 to 14% respectively and the HDL remains stable.[16-18] The mean LDL cholesterol is higher in women compared with men above 65 years of age and at all age groups HDL- cholesterol levels was higher in women but from the Framingham study it is known that a low **H**DL cholesterol implicates a higher CHD risk in women than in men.[19] In the present study the incidence of dyslipidemia was higher in female diabetic patients when compared to male diabetic patients.

The incidence of occurrence of dyslipidemia is very high in type 2 diabetic patients. Health education should be provided to all the patients of type 2 diabetes mellitus about the dyslipidemia and the risk factor associated with it. Along with the blood sugar levels the lipid profile also should be monitored regularly to evaluate and treat the dyslipidemia. And hat would significantly reduce cardiovascular morbidity and mortality among the type 2 diabetes mellitus patients.

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**Conflict of interest:** None.
**Ethical approval:** The study was approved by the Institutional Ethics Committee.

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