# Lipid Profile of Kashmiri Type 2 Diabetic Patients

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**Abstract:** ***This cross sectional study was conducted at Department of Biochemistry, Govt. Medical College Srinagar Kashmir. A total of 120 Kashmiri Type 2 diabetic patients and 30 normal controls were randomly selected. Diabetic dyslipidaemia is characterized by raised triglycerides, low high density lipoprotein and raised low density lipoprotein. Determination of serum lipid levels in people with diabetes is considered a standard of care because detection and treatment of dyslipidaemia is one means of reducing cardiovascular disease risk. The lipid profiles and lipoprotein levels of 120 known diabetic patients were studied. Total cholesterol (TC), Triacylglycerol's (TG) Low density lipoprotein-cholesterol (LDL-C), and high density lipoprotein cholesterol (HDL-C) levels were assayed for each group using standard biochemical methods. Dyslipidaemia was defined using the national cholesterol education programme – adult treatment panel III (NCEP-AT III) criteria. BMI and waist and hip circumferences were measured.***

**Keywords:** Dyslipidemia, Atherogenesis, Diabetes Mellitus, Kashmir**.**

## 1. Introduction

Diabetes is a common endocrine disease and its complications are major stimuli for the enhancement of efforts towards its control. There are currently 119.2 million people with type 2 diabetes worldwide, and the number is expected to increase to 212.9 million, in the year 2011 [1]. Diabetes mellitus is a major risk factor for morbidity and mortality due to coronary heart disease (CHD), cerebrovascular disease, and peripheral vascular disease. Metabolic control and duration of type 2 diabetes are important predictors of coronary heart disease (ischemic heart disease) in elderly subjects, particularly in women [2]. Certain racial and ethnic groups have a greater risk of developing diabetes. Majority of those that suffer from this disease are from Africa and Asia (3). This may be due to genetic disposition and life style of people in these areas.

The disease is accompanied in many cases by secondary alterations of protein and fat metabolisms resulting in an array of physical disorders [4] Lipids and lipoproteins abnormalities are well known risk factors for heart disease. Elevated levels of triacylglycerol's (TG), cholesterol, and low density lipoprotein-cholesterol(LDL-C) are documented as risk factors for atherogenesis [5] .The blood level of high density lipoprotein- cholesterol (HDLC) in contrast bears an inverse relationship to the risk of atherosclerosis and coronary heart disease. The higher the level, the smaller the risk [(6] [7). Lipid abnormalities play an important role in the causation of Diabetic atherosclerosis [8] [9] but the pathophysiology is complex [10] and clearly multifactorial, with dysfunction of the fibrinolytic system [11] pro-oxidative state [12], hyperglycemia [13] [14] and possibly Hyperinsulineamia [15] also explaining part of the increased susceptibility of people with diabetes to atherosclerotic complications.

Abnormal lipid profiles and lipoprotein oxidation (especially LDL-C) are more common in diabetics and are aggravated with poor glycaemia control. As diabetic patients constitute a unique group with different lifestyles and genetic disposetions, the measurement of their lipid profile is needed to investigate how their lipid metabolism is affected by diabetes. Considering the probable disorders of lipid profile and acceleration of atherosclerotic process, this work assessed the lipid profile of a randomly selected group of adult Kashmiri diabetics and compared them with controls.

## 2. Material and Methods

### 2.1 Patient Selection

The subjects used in the study were diabetic patients who attend the investigative laboratory of Department of Biochemistry, Govt. Medical College Srinagar. A total of 120 diabetic patients and 30 healthy controls were randomly selected. Patients with other ailments and metabolic disorders were excluded from the study. Diabetes was ruled out in the control group by asking questions about the signs of diabetes such as polyuria, polydipsia and recent weight loss. Laboratory tests were also used to confirm the absence of diabetes in the control group. Ethical clearance was sought and obtained for the study from the hospital. The aim of the study was explained to the subjects by the physician and those who gave informed consent were included in the study by the researchers.

In both subjects, venous blood samples were obtained after overnight fast into tubes containing lithium heparin (for lipid profile) and EDTA (for blood glucose) as anticoagulants. The samples were centrifuged at 1500 rpm for 5 min to obtain the plasma. The Plasma was used for the analysis of cholesterol (TC), triacylglycerol's (TG), high density lipoprotein (HDL-C), and glucose were assayed using test strips manufactured. Blood pressure was measured on left arm by auscultatory method using mercury sphygmomanometer. The individuals were made comfortable and seated at least for five minutes on the chair before measurement. Hypertension was defined as systolic blood pressure (sbp) > 140 mmhg and/or diastolic blood pressure (DBP) > 90 mmHg as per US seventh joint national committee on detection, evaluation and treatment of hypertension [16] criteria [17].

Body weight was measured (to the nearest 0.1 kg) with subject standing motionless on the bathroom weighing scale [18]. Each weighing scale was standardized every day with a weight of 50 kg. Height was measured (to the nearest 0.1 cm) with the subject standing in an erect position against a vertical scale of portable stadiometer and with the head positioned so that the top of the external auditory meatus was in level with the inferior margin of the bony orbit. BMI was calculated as weight in kilograms divided by squared height in meter. Conventional BMI cut off points were applied to classify the study populations into underweight (BMI < 18.5 kg/m), normal BMI (18.5 BMI < 25 kg/m) and overweight (BMI 25 kg/m). Waist and hip circumferences were measured twice to the, nearest centimeter and the mean was used for subsequent analysis. Waist circumference (WC) was measured half way and between the xiphisternum and the umbilicus while Hip Circumference (HC) was measured at the level of the greater trochanters. The waist hip ratio (WHR) and the waist to height ratio (WHtR) were then computed for each patient. Elevated WC was defined as WC = 102 cm for men and 88 cm for women (Lean et al., 1995), while elevated WHR was defined as WHR = 0.95 for men and 0.88 for women [19).

### 2.2 Statistical Analysis

The statistical software SPSS (version 15) was used for data analysis. The mean values of WC, HC, BMI, WHR, WHtR and BP was determined. The Mann-Whitney U Test was used to compare between the variables. Statistical Significance was taken as $p<0.05$.Correlations was examined using the Spearman Rho correlation coefficients. Multivariate regression analysis was use to investigate the correlations between the lipid variables and gender.

## 3. Results

The clinical and biochemical characteristics of the subjects in this study are shown in [Table 1]. Of the 120, 70 were female while 50 were male giving a male to female ratio of 1:1.4. The mean age, duration of DM and BMI were similar in both sexes waist circumference, hip circumference and waist to height ratio were significantly higher among the female diabetics The mean TC (4.07 ± 1.3 vs 4.6 ± 0.8, p = 0.001), high density lipoprotein C (HDL-C) (1.26 ± 0.4 vs 1.45 ± 0.35, p = 0.047), low density lipoprotein C (LDL-C) (2.38 ± 1.1 vs 2.93 ± 0.7, p = 0.005) were significantly higher among the female subjects, while triglyceride was higher among the male subjects but was not statistically different from the female (1.23 ± 0.4 vs 0.82 ± 0.6, p = 0.068). There was no statistical difference in the FBS of both subjects. The frequency pattern of lipid profile in type 2 diabetics with dyslipidemia is shown [Table 2]. None of the patients have all the four lipid values outside the clinical target. The most frequent lipid combination was TC+HDLC.

**Table 1:** Clinical and Biochemical Characteristics of the Subjects

| *Characteristics* | *Men (Mean ±SD)* | *Women (Mean ±SD)* | *p Value* |
|---|---|---|---|
| Number of Subjects | 50 | 70 | |
| Age (years) | 62.1 ± 12.2 | 60 ± 11.5 | 0.36 |
| Duration of DM (years) | 3.71 ± 2.3 | 3.92 ± 3.6 | 0.73 |
| Body Mass Index (kg/m2) | 26 ± 6.1 | 27.32 ± 5.7 | 0.25 |
| Waist Circumference (cm) | 94.3 ± 13.1 | 101.5 ± 13.1 | 0.005 |
| Hip Circumference (cm) | 99.3 ± 13.5 | 106 ± 13.7 | 0.003 |
| Waist Height Ratio | 0.95 ± 0.005 | 0.95 ± 0.005 | 0.8 |
| Total Cholesterol (mmol/l) | 4.07 ± 1.3 | 4.8 ± 0.8 | 0.0001 |
| LDL-C (mmol/l) | 2.38 ± 1.1 | 2.93 ± 0.7 | 0.005 |
| HDL-C (mmol/l) | 1.26 ± 0.4 | 1.45 ± 0.35 | 0.047 |
| TG (mmol/l) | 1.23 ± 0.4 | 0.82 ± 0.6 | 0.068 |
| FBS (mmol/l) | 7.94 ± 3.5 | 8.23 ± 3.5 | 0.707 |

**Table 2:** Distribution of lipid profile among Dyslipidemic type 2 DM

| | *Male* | | *Female* | | *Combined* | |
|---|---|---|---|---|---|---|
| | *Frequency* | *%* | *Frequency* | *%* | *Frequency* | *%* |
| TC+↓HDLC+LDL | 2 | 10.5 | 2 | 5.3 | 4 | 7 |
| TC+↓HDLC | 0 | 0 | 0 | 0 | 0 | 0 |
| LDLC+ | 2 | 10.5 | 2 | 5.3 | 4 | 7 |
| $TG^{+}$ ↓HDLC | 2 | 10.5 | 0 | 0 | 2 | 3.5 |
| TG only | 2 | 10.5 | 4 | 10.5 | 6 | 10.5 |
| ↓HDLC only | 4 | 21.1 | 12 | 31.6 | 16 | 28.1 |
| LDLC only | 0 | 0 | 0 | 0 | 0 | 0 |
| TC only | 1 | 5.3 | 6 | 15.7 | 7 | 12.3 |
| Total | 19 | 100 | 38 | 100 | 57 | 100 |

## 4. Discussion

Patients with Diabetes Mellitus have a high prevalence of coronary artery disease (CAD).The major risk factors in DM are hyperglycaemia dyslipidaemias and hypertension. Diabetic dyslipidaemia is characterized by elevated levels of very low density lipoproteins cholesterol (VLDL-C), low density lipoprotein cholesterol (LDL-C) and lower levels of high density lipoproteins (HDL-C), often referred to as the lipid triad. Lipid abnormalities in diabetic patients are likely to play an important role in the development of atherogenesis and so are called atherogenic dyslipidaemia. An issue of considerable interest is the relative contribution of each component of atherogenic dyslipidaemia to CAD risk. Growing evidence suggests that all the components of lipid triad are independently atherogenic. The major risk factors in DM are glycaemic status, dyslipidaemia and hypertension. The present study was an effort to provide an insight into some of the risk factors in DM. In this study we observed that a high percentage of type 2 diabetic patients have moderate to high risk levels of TC, TG, LDL-C, HDL-C. This percentage is quite higher for TC and LDL-C. Diabetes mellitus has been associated with abnormal lipid profiles (20-22). Hypertriglyceridemia is associated with increased postprandial lipidemia and accumulation of atherogenic remnant particles (23).

Although, concentrations of total and LDL cholesterol in diabetic individuals are reportedly comparable with level found in people without diabetes, low levels HDL cholesterol and elevated TG levels, both probable contributors to CVD, have been reported in Type 2 diabetes (24-27).The value of total cholesterol, LDL-C and Triglyceride were found to be

lower; while that of the HDL -C was higher to those of diabetic patients studied by (28) in Lagos an urban area of the country. This same pattern was also the case among African-American diabetics studied in USA though the ADA criteria were use in their own study (29) .The life style, environment, occupation and level of education may account for these differences. The female subjects in this study had significantly higher HDL and LDL cholesterol but lower triglyceride level than their male counterpart. This is consistent with previous studies in African Americans (29). Race and sex differences in patterns of serum lipids have been noted in diabetes (30, 31).

## 5. Conclusion

It is concluded that type 2 diabetic patients have a high frequency of atherogenic dyslipidemia especially for TC and LDL-C. It is suggested that along with glycemic control physicians should focus more on lipid profiles also. It is important to realize that hyperlipidaemia and the resultant macro vascular disease can develop even in the 'prediabetic phase' of Type 2 DM. Proper management of Diabetes mellitus in terms of adequate access to information and making necessary lifestyle changes will help in maintaining a normal lipid profile and reduce the risk of cardiovascular diseases. Networking among people suffering from this ailment should be encouraged and the general populace should also be well educated on the need to check their lipid profile regularly. Efforts should therefore be made to continuously educate the populace on diabetes, its management, feeding and life styles. Hence, early detection and correction of dyslipidaemic state is essential in the management of diabetic patients.

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