

## SERUM LIPID PROFILE STATUS IN PREDIABETES AND NEWLY DIAGNOSED TYPE 2 DIABETES MELLITUS PATIENTS IN A TERTIARY CARE HOSPITAL IN BANGLADESH

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### ABSTRACT

Dyslipidemia in diabetic patients plays an important role in acceleration of macrovascular atherosclerosis. Considering the prevalence and increased risk of cardiovascular diseases in diabetic patients, it is becoming necessary to assess the lipid profile of both prediabetic and diabetic individuals. Serum lipid profile including the levels of total cholesterol, triglyceride, HDL-cholesterol and LDL-cholesterol of prediabetics and newly diagnosed type 2 diabetes mellitus (T2DM) patients have been studied in this study. Hyperlipidemia has documented causative relation with CAD, but the major risk associated with diabetes may be due to the associated hyperlipidemia. The study revealed that dyslipidemia is present in both prediabetes and newly diagnosed type 2 diabetics. Decreased serum high-density lipoprotein cholesterol (HDL-C) levels was found in prediabetes whereas it was normal in T2DM. Thus, the study clearly shows the relationship between prediabetics and type 2 diabetes with dyslipidemia, which may influence increased coronary artery disease (CAD) risk.

**Key words:** Dyslipidemia, Lipid Profile, Type 2 Diabetes Mellitus.

### Introduction

Diabetes mellitus and prediabetes are major public health issues worldwide as well as in our country. Type 2 diabetes mellitus (T2DM) patients have increased risk of coronary artery disease leading to death. Dyslipidemia and hypertension are major modifiable risk factors for type 2 diabetes mellitus with coronary artery disease<sup>1</sup>. The presence of dyslipidemia in association with type 2 diabetes keeps the patient at higher risk of CAD.

Lipid abnormalities in diabetes patients are typically characterized by increased total cholesterol, increased triglycerides, decreased high density lipoprotein cholesterol and increased low density lipoprotein cholesterol<sup>2</sup>.

Abnormal lipid parameters are common in people with T2DM and prediabetes but the pattern of the different lipids may vary between ethnic groups, economic levels and access to health care<sup>3</sup>. Abnormalities in lipid metabolism are important risk factors for increased incidence of diabetes associated complications. The most important prediction factor for these complications are lipid profile abnormalities.

The aim of this study was to assess of lipid status in prediabetics and newly diagnosed T2DM which may be helpful for prevention of coronary artery diseases. This can lead to uncomplicated long and healthy life of the people.

## Materials and Methods

This cross-sectional study was carried out from July 2013 to January 2014 in the department of Biochemistry and Molecular Biology, Bangabandhu Sheikh Mujib Medical University (BSMMU), Dhaka, Bangladesh. A total of 94 subjects age ranging from 20-80 years were included in this study. Out of the 94 subjects, 30 (15 males, 15 females) were selected as healthy controls, 32 (15 males, 17 females) were prediabetic and 32 (19 males, 13 females) were newly diagnosed type 2 diabetic patients. Blood samples were randomly collected from one-point collection center of BSMMU.

Serum lipid profile was measured after an overnight fasting of at least 10 hours. Serum total cholesterol levels were determined by enzymatic (CHOD-PAP) colorimetric method and triglyceride by enzymatic (GPO-PAP) method of Jacobs and Van demark. HDL-C and LDL-C were estimated using precipitant and Friedewald formula<sup>4</sup>. All the above parameters

under investigations were determined in the serum of patients and controls. All values were expressed as mean $\pm$ SD. Statistical significance of differences among study groups were evaluated by One way Anova test, p-value <0.05 considered as significant.

Height and weight of study subjects were measured. BMI was calculated as weight (kg)/height(m)<sup>2</sup>. BMI of 18 to 24.9 was considered normal, 25 to 29.9 as overweight and 30 and above as obese. Dyslipidemia is determined according to the recommendation of NCEP ATP III<sup>5</sup>.

## Results

Prediabetes and newly diagnosed type 2 DM patients were in overweight group according to BMI. Females were more in prediabetes and males were more in diabetic patients. Table I shows the age range and anthropometric characteristics of the study population.

**Table I:** Characteristics of study subjects (n=94)

Variables	Controls (n=30)	Prediabetes (n=32)	T2DM (n=32)	p values
Age in years	36.5 $\pm$ 8	39 $\pm$ 7	40.6 $\pm$ 7.8	0.157
Sex (Female, Male)	15,15	19,13	15,17	0.257
Height (cm)	159.06 $\pm$ 7.74	159.93 $\pm$ 7.87	160.44 $\pm$ 7.82	0.754
Weight (kg)	62.73 $\pm$ 14.56	68.56 $\pm$ 10.89	65.85 $\pm$ 11	0.128
BMI (kg/m <sup>2</sup> )	24.97 $\pm$ 6.77	26.92 $\pm$ 4.75	25.73 $\pm$ 5	0.313
Waist (cm)	85.97 $\pm$ 13.56	91.13 $\pm$ 9.21	90.56 $\pm$ 10.37	0.105
Hip (cm)	98.24 $\pm$ 15.34	101.68 $\pm$ 9.71	100.21 $\pm$ 9.92	0.462
W:H ratio	0.88 $\pm$ 0.06	0.89 $\pm$ 0.04	0.9 $\pm$ 0.04	0.076

Results were expressed in mean $\pm$ SD. One way ANOVA was done to determine the level of significance.

Hypercholesterolemia and hypertriglyceridemia were found in both prediabetes and newly

diagnosed type 2 DM patients (Table II). LDL-C level was also increased in both prediabetes and newly diagnosed type 2 DM patients whereas HDL-C is decreased than normal level in only prediabetes subjects (Table II).

**Table II:** Lipidemic status of study subjects (n=94)

Variables	Controls (n=30)	Prediabetes (n=32)	T2DM (n=32)	p values
TC (mg/dL)	188.45±43.8	206.03±38.84	212.92±63	0.132
TG (mg/dL)	149.56±69.4	175.31±101.79	200.34±96	0.082
LDL-C (mg/dL)	118.03±37	133.95±31.83	138.76±48	0.103
HDL-C (mg/dL)	43.35±11.82	37.51±8.48	43.1±12.31	0.038

Results were expressed in mean±SD. One way ANOVA was done to determine the level of significance.

### Discussion

Presence of dyslipidemia in prediabetes and newly diagnosed type 2 diabetics is evident in this study. All the components of lipid profile were detected abnormal in prediabetes subjects. In newly diagnosed type 2 diabetics, HDL-C level was normal but other components were abnormal.

Kansal & Kamble studied dyslipidemia in prediabetic individuals<sup>6</sup>. Their findings are similar with our study in comparison of all the components of lipid profile. They found significantly higher levels of total cholesterol, triacylglycerol and low density lipoprotein cholesterol. But high density lipoprotein cholesterol level was significantly lower in prediabetes cases than healthy controls.

Bhowmik et al<sup>1</sup> found normal serum HDL-C level in 180 T2DM patients but in 90% of total cases it was low. In our study, both prediabetic and newly diagnosed T2DM patients were overweight. It is similar to the study of Reng et al<sup>7</sup> and Biadgo et al<sup>8</sup>. They found more overweight diabetic patients than obese subjects.

The pattern of dyslipidemia revealed elevated TG, TC and LDL in T2DM in different studies<sup>7-11</sup>, which is similar to our results. But low HDL of T2DM patients in Reng et al<sup>7</sup> is not same as our study. We found normal HDL levels of newly diagnosed T2DM subjects which is similar to the study of Biadgo et al<sup>8</sup>. But their healthy control group had significantly higher HDL.

Elevated serum cholesterol levels increase the cardiovascular morbidity associated with type 2 diabetes and can be an important causative link in majority of cases. Epidemiological studies provided a large body of evidence for the relationship between serum cholesterol level and the risk of CAD. In the multiple risk factor intervention trial, CAD risk declined with progressively lower cholesterol levels<sup>12</sup>.

In conclusion, the present observation supports the association between dyslipidemia and type 2 diabetes that may influence the mechanism by which type 2 diabetes is associated with increased CAD risk. The presence of type 2 diabetes alone is taken as an indication for lipid lowering therapy as a primary CAD prophylaxis which includes therapeutic lifestyle changes (TLC) as well as drug therapy. The presence of dyslipidemia in prediabetes or type 2 diabetes warrants a more intensive drug therapy to successfully achieve the NCEP ATP III recommendations<sup>4</sup>.

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