

Association of Dyslipidemia with Underweight Body Mass Index in Type 2 Diabetic patients

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ABSTRACT

Background: Type II diabetes mellitus is one of the most prevalent disease worldwide. T2DM is the secondary cause of dyslipidemia and this can stimulate atherosclerosis and coronary artery disease. Among underweight or lean patients, the chances of dyslipidemia are high.

Aim: To find the association of dyslipidemia with underweight body mass index in type 2 diabetic patients

Study design: Case control study.

Setting & duration: Mayo hospital , Lahore. Six months i.e. from January 2017 to June 2017.

Methods: Patients of T2DM were included and divided as case and control. Cases of underweight BMI and controls of normal BMI were included. Lipid profile was obtained and dyslipidemia was noted. Odds ratio was calculated.

Results: The mean age of cases was 61.26±7.52years while mean age of controls was 60.31±4.71 years. There were 97 (64.7%) males and 53 (35.3%) females in case group while there were 89 (59.3%) males and 61 (40.7%) females in control group. Among cases, dyslipidemia was present in 67 (44.7%) patients while 83 (55.3%) had normal lipid profile. But among controls, dyslipidemia was present in 36 (24.0%) patients while 114 (76.0%) had normal lipid profile. The risk of dyslipidemia was 2.556 (95% CI; 1.56-4.189) in underweight patients (p<0.001).

Conclusions: There is a significant association of underweight BMI and dyslipidemia

Key words: type II diabetes mellitus, dyslipidemia, underweight, body mass index

INTRODUCTION

Type 2 diabetes mellitus (T2DM) is a metabolic disorder, characterized by hyperglycemia resulting from defects in insulin secretion, insulin action, or both.^{1, 2} The International Diabetes Federation has estimated that the number of people with diabetes worldwide in 2015 was 415 million and this is projected to reach 642 million by 2040.³ In 2015 diabetes was the leading cause of mortality, whereby 5 million people died from diabetes and diabetes-related complications.³ There are many co-morbidities associated with DM. Diabetes affects many metabolic processes in body and one of them is lipid metabolism. DM causes dyslipidemia that contributes to the complications associated with DM.⁴ Diabetic patients often suffer from hypertension and also have abnormal lipoprotein metabolism^{2,5}.

Dyslipidemia is an abnormal concentration of lipids or lipoproteins in the blood. Dyslipidemia manifest as elevated total cholesterol, increased triglycerides, elevated low density lipoprotein cholesterol and a decrease in HDL cholesterol⁶. Dyslipidemia is one of the major risk factors for

cardiovascular diseases in T2DM⁵. T2DM is a common secondary cause of dyslipidemia, especially if blood sugar level is poorly controlled, which in turn is an important risk factor for atherosclerosis and coronary artery disease⁷.

BMI provides a guideline for weight in relation to height and is equal to the body weight in kilograms divided by the height in meters squared. Type 2 DM affects many organ of body resulting in disastrous complications⁴. Many studies conducted for the presence of dyslipidemia in obese diabetic patients which showed that dyslipidemia is strongly associated with DM and contributes to the complications. A little data is available for dyslipidemia in non-obese patients that include normal and underweight^{8,9}. So we conducted this study to find the relationship of dyslipidemia with low BMI i.e. underweight patients of T2DM.

The objective of the study was to find the association of dyslipidemia with underweight body mass index in type 2 diabetic patients.

MATERIAL AND METHODS

This case control study was conducted at Mayo hospital, Lahore during a period of six months from January 2017 to June 2017. Sample size of 300 patients is estimated using 95% confidence level, 5%

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margin of error and taking expected frequency of underweight BMI as 26% in T2DM patients. Simple random sampling technique was used.

Inclusion Criteria: Patients aged between 40-70 years, both genders with T2DM (BSR>200mg/dl).

Cases: underweight patients (BMI<18.5kg/m²).

Control: Normal BMI (18.5-24.9kg/m²)

Exclusion Criteria: Patients taking statins for abnormal lipid profile and newly diagnosed T2DM patients

Data Collection Procedure: 300 patients fulfilled selection criteria were included in the study through Department of Medicine, referred to Department of Cardiology, Mayo hospital Lahore for assessment of lipid profile. Informed consent was obtained. Demographic details of patients (name, age, sex, BMI, duration of T2DM) were obtained. Two groups were formed on the basis of BMI. Patients with BMI<18.5kg/m² were included as cases. Controls were included as they have normal BMI i.e. 18.5-24.9kg/m². Then blood sample of patients was taken by using 5cc BD syringe and were sent to the laboratory of the hospital for assessment of lipid profile. Reports were assessed and if cholesterol>200mg/dl, LDL>150mg/dl, HDL<40mg/dl, then dyslipidemia was labeled. All the data was recorded in proforma.

Data Analysis plan: SPSS version 21.0 was used to enter and analyzed the data. Association between underweight BMI and dyslipidemia was measured through calculating odds ratio. OR>1 was considered as significant risk of association.

RESULTS

In this study, we included 300 patients; 150 cases and 150 controls. The mean age of cases was

61.26±7.52 years while mean age of controls was 60.31±4.71 years. There were 97(64.7%) males and 53(35.3%) females in case group while there were 89(59.3%) males and 61(40.7%) females in control group. The mean duration of T2DM in case group was 7.27±1.06 years while in control group was 8.94±1.63 years. The mean HbA1c of cases was 8.52±1.16% while 7.41±2.39% in control group (Table 1).

The mean total cholesterol of cases was 165.83±44.78mg/dl while of controls was 149.53±21.09mg/dl. The mean LDL of cases was 127.28±41.26mg/dl while of controls was 96.10±15.21mg/dl. The mean HDL of cases was 29.36±10.13mg/dl while of controls was 42.53±11.74mg/dl. The difference was significant (P<0.05). Table 2

Among cases, dyslipidemia was present in 67 (44.7%) patients while 83 (55.3%) had normal lipid profile. But among controls, dyslipidemia was present in 36(24%) patients while 114(76.0%) had normal lipid profile. The risk of dyslipidemia was 2.556 (95% CI; 1.56-4.189) in underweight patients (p<0.001). Table 3

Table 1: Demographic characteristics of patients

	Case (underweight)	Control (normal BMI)
n	150	150
Age (years)	61.26±7.52	60.31±4.71
Gender		
Male	97 (64.7%)	89 (59.3%)
Female	53 (35.3%)	61 (40.7%)
Duration of T2DM	7.27±1.06	8.94±1.63
HbA1c (%)	8.52±1.16	7.41±2.39

Table 2: Lipid profile of patients

Characteristics	Case	Control	Significance
Total cholesterol (mg/dl)	165.83±44.78	149.53±21.09	0.000
LDL (mg/dl)	127.28±41.26	96.10±15.21	0.000
HDL (mg/dl)	29.36±10.13	42.53±11.74	0.000

Table 3: Association of dyslipidemia with underweight BMI

		Group		Total	OR 95% CI
		Case	Control		
Dyslipidemia	Yes	67 (44.7%)	36 (24.0%)	103 (34.3%)	2.556
	No	83 (55.3%)	114 (76.0%)	197 (65.7%)	1.56-4.189
Total		150 (100%)	150 (100%)	300 (100%)	

DISCUSSION

Dyslipidemia is an important risk factor for cardiovascular complications in T2DM¹⁰. Dyslipidemia is an abnormal concentration of lipids or lipoproteins in the blood. Dyslipidemia manifest as

elevated total cholesterol, increased triglycerides, elevated LDL cholesterol and a decrease in HDL cholesterol^{11,12,13}.

In our study, we included 300 patients; 150 cases and 150 controls. The mean age of cases was 61.26±7.52 years while mean age of controls was

60.31±4.71years. There were 97(64.7%) males and 53 (35.3%) females in case group while there were 89(59.3%) males and 61 (40.7%) females in control group. The mean duration of T2DM in case group was 7.27±1.06years while in control group was 8.94±1.63years. The mean HbA1c of cases was 8.52±1.16% while 7.41±2.39% in control group.

In our study, the mean total cholesterol of cases was 165. 83±44.78mg/dl while of controls was 149.53±21.09mg.dl. The mean LDL of cases was 127.28±41.26mg/dl while of controls was 96.10±15.21mg/dl. The mean HDL of cases was 29.36±10.13mg/dl while of controls was 42.53±11.74mg/dl. The difference was significant (P<0.05).

Barma et al reported that mean cholesterol level was 188.46±25.67mg/dl, mean LDL was 106.52±25.46mg/dl and mean HDL was 49.77±7.09mg/dl, which are comparable to our study¹⁴.

In our study, overall, dyslipidemia was present in 34.3% diabetic patients. Among cases, dyslipidemia was present in 67(44.7%) patients while 83 (55.3%) had normal lipid profile. But among controls, dyslipidemia was present in 36 (24.0%) patients while 114 (76.0%) had normal lipid profile. The risk of dyslipidemia was 2.556 (95% CI; 1.56-4.189) in underweight patients (p<0.001).

But one local study reported that dyslipidemia was present in 88.27% normal BMI patients while 20% in underweight patients¹⁵. Mehmood et al., reported dyslipidemia in 81.5% patients¹⁶ In another study by Abdel-Aal et al., dyslipidemia was found in 83.9% diabetics, among underweight patients, dyslipidemia was found in 67.9% while 76.4% in normal weight patients¹⁷. Similar findings of dyslipidemia were also reported by some other studies^{18,19,20}.

CONCLUSIONS

There is a significant association of dyslipidemia with underweight BMI of T2DM patients. Thus, in future, T2DM patients will be advised to maintain their body weight to reduce the risk of dyslipidemia and ultimately risk of cardiovascular diseases.

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