



Study on Lipid Profile in Type 2 Diabetes Mellitus with Obesity

KEYWORDS

Obesity, BMI, Lipid Profile & Type 2 Diabetes Mellitus

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ABSTRACT *Diabetes is a global endemic with rapidly increasing prevalence in both developing and developed countries. Obesity is an excessive accumulation of body fat and in its gross manifestation possesses a real threat to health. It is well established that obesity is directly or indirectly associated with type 2 diabetes mellitus. My aim was to compare lipid profile in Type 2 diabetics with obesity and non diabetic obese subject. We conclude that all the lipid fractions (except HDL-c) are abnormally elevated in obese type 2 diabetics when compared with obese controls.*

Introduction:

In the ancient Sanskrit Literature, diabetes mellitus was described as "honey-urine disease," associated with gross emaciation and wasting. Diabetes is a global endemic with rapidly increasing prevalence in both developing and developed countries.¹ Obesity is an excessive accumulation of body fat and in its gross manifestation possesses a real threat to health.² It is well established that obesity is directly or indirectly associated with type 2 diabetes mellitus.³ Furthermore, alterations in body fat distribution are associated with changes in lipids and lipoproteins and with increased coronary heart disease (CHD).⁴ Moreover, obesity is considered as part of the metabolic syndrome in the pathogenesis of type 2 diabetes.⁴

Different methods are used for the measurement of obesity including the determination of (i) body mass index⁵, (ii) skin fold thickness or waist hip ratio⁶, (iii) fat cell size and number, and (iv) body density.⁷ Body mass index has gained favour as a better measure for adiposity^{8,9} that is frequently used as a measure for body fatness in large epidemiological studies.¹⁰ My aim was to compare lipid profile in Type 2 diabetics with obesity and non diabetic obese subject.

Material and methods:

The present study was conducted in Department of Physiology, Hi-tech Medical College and Hospital, Rourkela, Odisha during the period from October, 2015 to July, 2016. Weight was recorded in kilograms with the subject standing on the weighing machine without shoes and minimum clothing. Weight of the patients and controls were recorded in the same weighing machine. Height was recorded with the subject barefooted, feet together, back and heels against the upright bar of the height scale; head upright in Frankfurt horizontal plane – look straight ahead. The height measuring equipment consisted of a vertical bar with a horizontal bar of wood which was brought down snugly on examinee's head.¹¹ Body Mass index was calculated from the formula: BMI = weight in kilograms / (height in meters)² Patients were taken as obese if their body mass index was 27.8 and 27.3 for males and females respectively.¹² Randomly selected, 50 subjects out of them 25 were obese Type 2 DM patients and 25 were obese non diabetic control were studied for following biochemical parameters:

- i. Blood Glucose by GOD-POD methods.¹³
- ii. Total Cholesterol (TC) by enzymatic end point CHOD-POD methods.¹⁴
- iii. Triglyceride (TG) by enzymatic glycerol phosphate oxidase/peroxidase methods.¹⁵
- iv. HDL-Cholesterol by direct enzymatic end point method.^{16,17}
- v. LDL-Cholesterol by Friedewald's formula.¹⁸
- vi. VLDL-Cholesterol by Friedewald's equation.

LDL-c = Tc-HDL-c(TG/5)

We used student t-test to find the statistical significance. A P-value <0.05 was to be considered statistically significant.

Results and Discussion:

In the present study we evaluate the lipid profile in type 2 diabetes mellitus with obesity. Table 1 shows the age and anthropometric characters of the study population. Table 2 shows the estimated levels of lipid profile in obese type 2 diabetes and obese non diabetic cases along with fasting blood sugars of obese type 2 DM. Table-2 shows the mean TC, TG, HDL-c, LDL-c, VLDL-c, and FBS. In our study, the levels of TC, TG, LDL-c, VLDL-c were significantly increased while HDL-c levels did not show statistically significant difference in the two group.

Table 1: Anthropometric Measurements of the study population:

Variables	Obese type2 DM(n=25)	Obese Control (n=25)
Age (Yrs)	46.7±4.12	48.4±4.01
Weight (Kg)	79.5 ± 9.07	77.03 ± 5.0
Height (cm)	78.04±7.9	80.03±8.13
BMI	33.02±4.1	32.06±3.2
Waist circumference(cm)	103.21±9.43	96.76±7.24

Table 2: Comparison of lipid profile Between Obese type-2 DM & Obese Control:

Parameters	Obese type2 DM(n=25)	Obese Control (n=25)
TC	245.36±35.72	154.06±10.06
TG	203.97±56.04	117.56±21.9
HDL-c	43.4 ± 9.02	46.25 ± 4.33*
LDL-c	165.61 ± 14.5	136.2 ± 34.7
VLDL-c	42.52±10.9	22.02±4.46
FBS	142.50 ± 37.61	110.21 ± 20.2

(Statistically not significant (P-value <0.05); *statistically not significant)

Obesity, Dyslipidemia and Diabetes were considered as independent risk factors for coronary vascular disease and is associated with high amount of morbidity and mortality. Even though they were independent risk factors, the three entities were closely related i.e. obesity leads to insulin resistance which in turn causes type 2 diabetes and both together leads to dyslipidemia.

Diabcare Asia-India study conducted nationwide survey of patients attending tertiary diabetes care centers and reported a mean age of onset of diabetes as 43.6years with a mean duration of diabetes of 10.0years and 90.6% having T2DM (Raheja B S, Kapur A-2001). This study showed that there was not much sex variation in the prevalence of T2DM with obesity; with only a slight increase in female group, a study made by Nalchjavani and others found that all types of dyslipidemia were significantly more prevalent in females.¹⁹ Women had higher HDL-C compared to men, high prevalence of hypertriglyceridemia in females due to their higher BMI. It showed that disease status was high in unemployed or employed with sedentary jobs.

The findings in this study showed that the obese T2DM patients had significantly higher serum triglycerides, LDL-C levels and serum VLDL-C levels; with significant lower HDL-C levels when compared to obese non diabetic cases. Total cholesterol levels were increased without significant 'p' value. Similar results had been observed by some.²⁰⁻²² Similar results were also seen in others but their HDL-C levels did not differ significantly.^{23,24} The studies of Santen et al (1972) and Peret et al (1974) observed mean serum triglyceride levels higher in obese diabetics in comparison to obese control subject.^{25,26} Hypercholesterolemia and hypertriglyceridemia were seen in this study.²⁷ Hypertriglyceridemia predisposes the patients to life threatening complications like diabetic ketoacidosis, coronary artery disease and lipaemia retinalis.²⁸ Sharma (1970) and Jain (1980) observed increase in the levels of serum total cholesterol, serum triglycerides, and serum phospholipids in diabetic subjects when compared to normal controls.^{29,30} Bijlani et al (1984) found HDL-C to be significantly lower in obese diabetics when compared to normal weight diabetics. Gambhir et al found that low HDL-C were independent risk factor for premature coronary artery disease.³¹ In a study at Joslin clinic also showed an inverse correlation of HDL-C with adiposity and triglyceride levels.

Conclusion:

We conclude that all the lipid fractions (except HDL-c) are abnormally elevated in obese type 2 diabetics when compared with obese controls. There are studies which seem to suggest that the lipoprotein distribution in Type 2 diabetes mellitus is not significantly altered by the degree

of metabolic control. Thus Lipid profile analysis must be made an integral part of Type 2 DM patients' clinical reviews and treatment. Type 2 DM and other diabetics must be educated on the risks they face as a result of their condition and the necessary steps they need to manage it.

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