

TO DETERMINE ASSOCIATION BETWEEN GLYCEMIC CONTROL AND LIPID PROFILE IN LEAN AND OBESE TYPE 2 DIABETES MELLITUS PATIENTS BASED ON BMI.

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Abstract

The prevalence rate of diabetes is increasing throughout the world mostly in the developing countries. WHO reported 32 million diabetes affected Indians in the year 2000. The International Diabetic Federation estimated that the number would rise to 69.9 million by 2025 and 80 million by 2030.Dyslipidemia, especially high LDL-C, is common in diabetes mellitus and strongly associated with poor glycemic control.

Aim: To find out if there is significant difference in lipid profile of lean and obese type 2 diabetes mellitus patients.

Material and methods: A hospital based cross sectional study was carried out at a tertiary care hospital, in medicine outpatient department (OPD) and ward under Medicine department of KIMSDU and having Diabetes mellitus type 2 conducted over a period of 18 months from November 2020 to March 2022. Total 100 cases were studied. Informed and written consent was taken from all patients and were explained about the same. All patients were subjected to detailed history, physical examination. Patients were divided into two groups Lean and Obese patients according to their BMI, 40 as lean and 40 as obese. All data was collected and compiled in micro-soft excel. Quantitative data was presented using mean and qualitative data by proportion and percentage. Analysis was done by applying appropriate analytical test.

Results: Out of total 100 cases 17% were lean type, 52% non-obese and 31% obese.Hypercholesterolemia was seen in 10% in lean, 25% in non-obese and 25% in obese group. But hypertriglyceridemia was more among lean people as compared to non-obese and obese group and LDL was more in obese group.

Conclusion: Present study revealed that lean T2DM had higher tendency of microvascular complications than obese T2DM. Lean T2DM is definitely different subset of population of T2DM with clinical characteristic different from those of other subtypes of T2DM non-obese and obese. Lean group of patients with T2DM should be evaluated thoroughly and treated accordingly to avoid further development of microvascular complications considering the inadequacy of BMI in distinguishing leanness, future studies should investigate the complex interaction between body composition, amount and distribution of adipose tissue and physical functioning in determining the development of lean diabetes.

Keywords: diabetes mellitus, lean, obese

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1. Introduction

Type 2 diabetes mellitus (Type 2 DM) is the predominant form of diabetes worldwide, accounting for 90% of cases globally.^[1] Type 2 DM is a heterogeneous group of metabolic disorders characterized by chronic hyperglycemia with disturbance of carbohydrate metabolism resulting from a defect in insulin secretion, insulin action or both. The dramatic rise in the prevalence of type 2 diabetes mellitus and the related disorders such as dyslipidemia, obesity, and hypertension could be related to rapid changes in lifestyle that has occurred during the past 50 years.^[2,3] The risk of diabetes increases progressively with increasing body mass index and waist-hip ratio. In obese patients with type 2 diabetes, a distinct "diabetic dyslipidemia" is characteristic of the insulin resistance syndrome.[4]

Lipid profile abnormality present in type 2 diabetes mellitus patients is shown by abnormal high level of triglycerides (TG), low density lipoprotein (LDL-C), very low density lipoprotein (VLDL-C) and the low levels of high density lipoprotein (HDL-C). ^[5,6] Altered lipid profile, especially high LDL-C, is very common in diabetes mellitus and it is strongly associated with poor glycemic control. Glycated haemoglobin (HbA1c) is the main tool for measuring longterm glycemic control.^[7]

Dyslipidemia, especially high LDL-C, is common in diabetes mellitus and strongly associated with poor glycemic control. Thus, this study was conducted to study abnormality in lipid profile and glycemic control in different BMI groups of type 2 diabetes mellitus patients. **Aim:**To find out if there is significant difference in lipid profile of lean and obese type 2 diabetes mellitus patients.

2. Material and methods

A hospital based cross sectional study was carried out at a tertiary care hospital, in medicine outpatient department (OPD) and ward under Medicine department of KIMSDU and having Diabetes mellitus type 2 conducted over a period of 18 months from November 2020 to March 2022. Total 100 cases were studied. Inclusion criteria: 1. All patients with type 2 diabetes mellitus irrespective of sex. 2. Diagnosis of diabetes based on American Diabetes Association criteria. 3. Patients with age > 18 years 4. Diabetic patients on oral hypoglycemic agents irrespective of duration of the treatment. Informed and written consent was taken from all patients and were explained about the same. All patients were subjected to detailed history, physical examination. Patients were divided into two groups Lean and Obese patients according to their BMI, 40 as lean and 40 as obese. All data was collected and compiled in micro-soft excel. Quantitative data was presented using mean and qualitative data by proportion and percentage. Analysis was done by applying appropriate analytical test.

3. Results

A total of 100 patients were enrolled in this crosssectional study who fulfilled the criterion for type 2 diabetes mellitus they were further divided into three groups depending on their body mass index (BMI) as lean (BMI 25 kg/m2) weight groups. Of them 17(17%) of the study population was categorized under lean group while 52(52%) and 31(31%) of the study population was under non obese BMI group and obese group respectively.

Group	Frequency	Percentage	
Lean	17	17	
Non obese	52	52	
Obese	31	31	
Total	100	100	

Table 1: Distribution of Body Mass Index of study population with type 2 diabetes mellitus

Of the 100 study population 17 (17%) of lean BMI group had total cholesterol of 206.30+13.8 mg/dl, non-obese BMI total cholesterol is 229.5 +22.9 mg/dl and obese BMI group is 238.80 +17.5 mg/dl. Serum triglycerides of lean BMI group is 189.15 +26.4 mg/dl, non-obese weight BMI is 168.20 +13.1mg/dl, obese group is 164.83 +12.3 mg/dl. Low density lipoprotein of lean BMI group 128.85 +11.5 mg/dl, non-obese weight BMI is 142.40 +11.3 mg/dl, obese group is 154.70 +15.9 mg/dl. High density lipoprotein of lean BMI group is 47.05 +4.5 mg/dl, non-obese weight BMI is 41.15 +5.4 mg/dl, obese group is 45.15 +3.8 mg/dl. Very low-density lipoprotein of lean BMI group is 39.1 +6 mg/dl, non-obese weight BMI is 37.35 +5.5 mg/dl, obese group is 35.85 +2.6 mg/dl

Section A-Research paper

To Determine Association Between Glycemic Control and Lipid Profile in Lean and Obese Type 2 Diabetes Mellitus Patients Based on BMI.

Lipid profile	Lean	Non-obese	Obese
Total cholesterol	206.30+13.8	229.5+22.9	238.80 +17.5
LDL cholesterol	128.85 +11.5	142.40+ 11.3	154.70 +15.9
VLDL cholesterol	39.1 +6	37.35 +5.5	35.85 +2.6
HDL cholesterol	47.05 +4.5	41.15 +5.4	45.15 +3.8
Serum triglyceride	189.15+26.4	168.20 +13.1	164.83+12.3

Table 2 – Different lipid profile parameters across 3 study groups



Hypercholesterolemia was seen in 10% in lean, 25% in non obese and 25% in obese group. But hyper trigleceridemia was more among lean people as compared to non obese and obese group and LDL was more in obese group.

4. Discussion

Of total 100 cases 17% were lean type, 52% normal and 31% obese. Study by Dr. Gita Bipin Chandra et al ⁶³ showed that 33% were lean, non obese and obese each. Review by George AM et al ⁷⁰ showed that 3.5% patients were lean with a BMI < 18.5.

Study by Dr. Gita Bipin Chandra et al [8] showed that mean BSL, HbA1C, VLDL, HDL and triglyceride was more in lean group, LDL was more in obese patients. Similar results were seen in present study. is higher (226.5 mg/dl) in comparison to non obese (193.1mg/dl) and obese (206.65 mg/dl). Blood glucose level was also higher in case of lean type 2 diabetes mellitus as compared as to non obese. These observations are associated with significantly high mean glycosylated hemoglobin level in lean type 2 diabetes mellitus cases than non obese and obese cases (9.15 vs 7.81 vs 8.44). This data is consistent with studies of S Das ^[9] and V. Sidhartha. ^[10]

Hypercholesterolemia was seen in 10% in lean, 25% in non obese and 25% in obese group. But

hyper trigleceridemia was more among lean people as compared to non obese and obese group and LDL was more in obese group. Study by Dr. Gita Bipin Chandra et al ^[8] showed similar results. Lower incidence of hypercholesterolemia and relatively higher incidence of hypertriglyceridemia is found in low body weight type 2 diabetes mellitus group of patients by different series of studies by K. Kannan ^[11], C.S. Yagnik et al.^[12]

5. Conclusion

Present study revealed that lean T2DM had higher tendency of microvascular complications than obese T2DM. Lean T2DM is definitely different subset of population of T2DM with clinical characteristic different from those of other subtypes of T2DM non-obese and obese. Lean group of patients with T2DM should be evaluated thoroughly and treated accordingly to avoid further development of microvascular complications Considering the inadequacy of BMI in distinguishing leanness, future studies should investigate the complex interaction between body composition, amount and distribution of adipose tissue and physical functioning in determining the development of lean diabetes.

6. References

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