JETIR.ORG ISSN: 2349-5162 | ESTD Year : 2014 | Monthly Issue
JOURNAL OF EMERGING TECHNOLOGIES AND INNOVATIVE RESEARCH (JETIR)
An International Scholarly Open Access, Peer-reviewed, Refereed Journal

LIPID PROFILE STATUS AND CORRELATION WITH DIABETIC PROFILES IN TYPE 2 DIABETES MELLITUS PATIENTS ATTENDING THE TERTIARY CARE HOSPITAL OF NATIONAL MEDICAL COLLEGE

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Abstract

Diabetes mellitus (DM) is a common metabolic disease characterized by hyperglycemia and metabolic disturbances of carbohydrates, proteins, and lipids principally caused by β cell dysfunction, consequently decreased insulin production or action. Dyslipidemia is also associated with diabetes mellitus. Elevated serum lipid level is associated with cardiovascular diseases such as atherosclerosis and myocardial infarctions.

The current study was a Comparative Cross-sectional and hospital-based study that was undertaken in the Outpatients and Inpatient Department of NMCTH, Birgunj, Parsa, Madhesh Province, Nepal. Diabetic profile and lipid profile were studied in 226 type 2 diabetes mellitus patients and 174 healthy subjects. The Pearson correlation analysis was done to find out the correlation of diabetic profile with lipid profile in the Type 2 Diabetic Nepalese population.

The comparison of diabetic profiles (fasting blood sugar, post-prandial blood sugar, glycated hemoglobin) showed significant differences between the groups (P value <0.05). Moreover, the comparison of lipid profiles between diabetic and non-diabetic populations revealed a significant difference in TG (P value: 0.02), total cholesterol (P value: 0.03), HDL (P value: 0.02), VLDL (P value: 0.05).

Our results revealed the presence of dyslipidemia in our diabetic population. Moreover, some diabetic profile parameters are significantly correlated with lipid profile test parameters. So, along with fasting blood glucose level, post-prandial blood glucose, glycated hemoglobin level lipid profile tests should be performed to assess the cardiovascular risks in type 2 diabetic patients.

Keywords: Diabetes mellitus, Dyslipidemia, Lipid profile

INTRODUCTION

Diabetes mellitus (DM) is a common metabolic disease characterized by hyperglycemia and metabolic disturbances of carbohydrates, proteins, and lipids principally caused by β cell dysfunction, consequently decreased insulin production or action.[1]

The parameters that can be measured in the diabetic profile are hemoglobin (HbA1c), fasting plasma glucose (FPG), and postprandial plasma glucose (PPG). The measurement of HbA_1c level is considered the gold standard for the assessment of glycemic control. Moreover, the concentration of HbA1c measurement reflects the formation of advanced glycated end products.[2]

Dyslipidemia is a common consequence of diabetes mellitus characterized by low High-Density Lipoprotein (HDL), elevated Low-Density Lipoprotein (LDL), total cholesterol, and Triglyceride (TG). Elevated LDL is associated with cardiovascular diseases such as atherosclerosis and myocardial infarctions .[(3,4)]

The present study is aimed at studying the diabetic profile and lipid profile parameters in Type 2 diabetes mellitus patients. The correlation of the fasting blood glucose, post-prandial blood sugar, and glycated hemoglobin was also carried out in the diabetic population.

METHODOLOGY

The current study was a Comparative Cross-sectional and hospital-based study that was undertaken in the Outpatients and Inpatient Department of NMCTH, Birgunj, Parsa, Madhesh Province, Nepal. Two hundred twenty-six (226) diabetic and one hundred seventy-four (174) healthy subjects were enrolled for the study within the study duration period of Six months (December 2022 to June 2023). The verbal and written consent was taken from the patients before enrolling into our study. Non-probability purposive sampling technique was used for the sample collection. The study variables for the study were Fasting Blood sugar, Postprandial blood sugar, HbA1C, TC, TG, HDL, LDL, VLDL Age, and Gender.

A fully automated clinical chemistry analyzer (Beckmann Coulter) was used to measure the lipid profile and the sugar profile in the patient's serum. The statistical tools MsExcel version 10 and Statistical Package for Social Science (SPSS) version 22 were used for the analysis and interpretation of the data. Ethical clearance was obtained from the Institutional Review Committee (IRC), National Medical College and Teaching Hospital, Birgunj, Nepal before starting the research (Ref no: F-NMC/618/079-080).

Statistical Analyses

All the data were entered in Microsoft Excel 2010 and converted to SPSS version 22 accordingly. Frequency and percentage will be calculated for descriptive statistics. The Chi-square test was applied to compare the categorical variables. Student's t-test was used to compare the mean between the two groups. Continuous data were expressed in the mean $\pm$ SD. Pearson correlation was applied for parametric data. P-value <0.05 was considered statistically significant.

Inclusion Criteria*:* Diabetes Mellitus patients who visited the inpatient and outpatient Department of the National Medical College and Teaching Hospital during the study period.

Exclusion Criteria*:* Those patients who were not willing to participate in our study will be excluded from our study.

RESULTS

The current study investigated the lipid profile status in Type 2 Diabetes mellitus patients in a tertiary care hospital at National Medical College, Birgunj, Nepal. We enrolled four hundred participants, out of which 226 are diabetics among these 84 are female and 142 are male. Out of the healthy control, 65 are female and 109 are male participants as depicted in Figure 1.

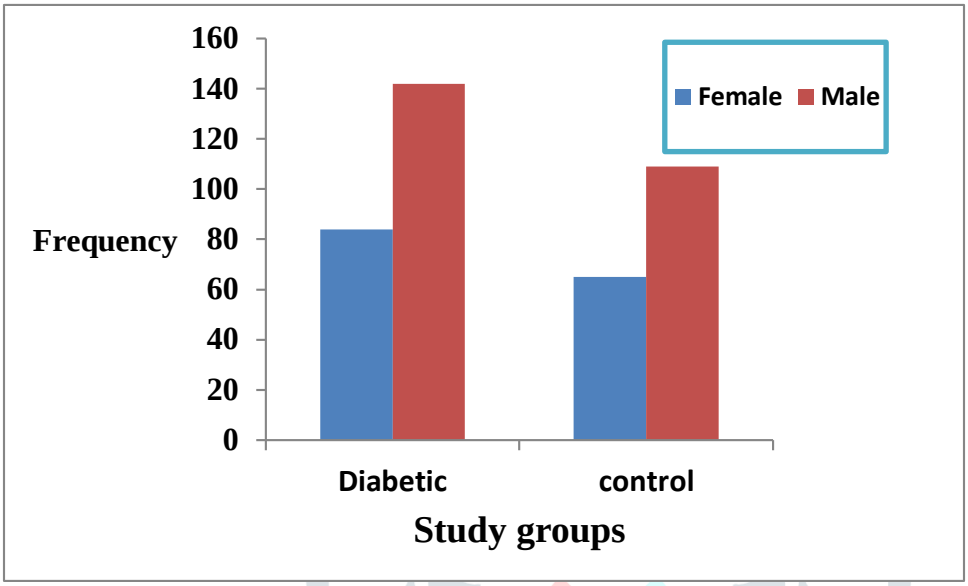

figure 1: Distribution of population based on gender (n=400)

The comparison of age between the diabetic and healthy controls revealed no significant difference (P value: 0.43). The comparison of diabetic profiles (fasting blood sugar, post-prandial blood sugar, glycated hemoglobin) showed significant differences between the groups (P value <0.05). Moreover, the comparison of lipid profiles between diabetic and non-diabetic populations revealed a significant difference in TG (P value: 0.02), total cholesterol (P value: 0.03), HDL (P value: 0.02), VLDL (P value: 0.05), as illustrated in table 1.

Table 1: Comparison of variables between diabetic and control groups

Variables	Diabetic Status	N	Mean ±Std. Deviation	P value*
Age (years)	Diabetes mellitus	226	50.97 ± 11.92	0.43
	Control	174	49.99 ± 12.97	
FBS (mg/dL)	Diabetes mellitus	226	159.03 ± 56.35	0.00*
	Control	174	105.23 ± 22.54	
PPBS (mg/dL)	Diabetes mellitus	226	270.41 ± 90.23	0.00*
	Control	174	168.16 ± 50.72	
HbA1c (%)	Diabetes mellitus	226	7.99 ± 1.72	0.00*
	Control	174	5.57 ± 0.85	
T. Cho (mg/dL)	Diabetes mellitus	226	274.55 ± 46.67	0.03*
	Control	174	168.00 ± 45.81	
TG (mg/dL)	Diabetes mellitus	226	206.31 ± 176.52	0.02*
	Control	174	170.93 ± 116.08	
HDL (mg/dL)	Diabetes mellitus	226	43.31 ± 9.84	0.02*
	Control	174	54.55 ±19.26	

VLDL(mg/dL)	Diabetes mellitus	226	41.20 ± 22.19	0.05*
	Control	174	34.23 ± 23.45	
LDL (mg/dL)	Diabetes mellitus	226	190.44± 41.93	0.04*
	Control	174	90.37 ± 39.63	

Table 2: Correlation of fasting blood glucose with lipid profile test parameters

S. No.	Variables	r value	P value*
1	TC	0.11	0.01*
2	TG	0.10	0.04*
3	HDL	-0.09	0.06
4	LDL	0.08	0.07
5	VLDL	0.09	0.05

Table 2 shows the correlation of fasting blood glucose with lipid profile parameters. It revealed a significant positive correlation with TC (0.73, 0.00), TG (0.08, 0.05), and LDL (0.12, 0.01). FBS was negatively correlated with HDL cholesterol (-0.05, 0.32), however this was not statistically significant.

table 3: correlation of post-prandial blood glucose with lipid profile parameters

S. No.	Variables	r value	P value*
1	TC	0.73	0.00*
2	TG	0.08	0.05*
3	HDL	-0.05	0.32
4	LDL	0.12	0.01*
5	VLDL	0.09	0.06

Table 3 shows the correlation of post-prandial blood glucose with lipid profile parameters. It revealed a significant positive correlation with TC (0.11, 0.01), and TG (0.10, 0.04). Post-prandial blood glucose was negatively correlated with HDL cholesterol (-0.09, 0.06), however, this was not statistically significant. Table 4 shows the correlation of glycated hemoglobin with lipid profile parameters. It revealed a significant positive correlation with TC (0.10, 0.04). Glycated hemoglobin was negatively correlated with HDL cholesterol (-0.07, .15). However, this was not statistically significant.

table 4: correlation of glycated hemoglobin with lipid profile parameters

S. No.	Variables	r value	P value*
1	TC	0.10	0.04*
2	TG	0.42	0.39
3	HDL	-0.07	0.15
4	LDL	0.09	0.02*
5	VLDL	0.04	0.37

DISCUSSIONS

Our study revealed the comparison of lipid profile parameters between diabetic and non-diabetic patients. The comparison of lipid profiles showed a significant difference between diabetic and non-diabetic patients concerning serum triglyceride, TC, LDL, VLDL, and HDL cholesterol (P value<0.05). Some studies have shown that diabetic patients are more prone to develop dyslipidemia in comparison to the non-diabetic population.[6] American Diabetic Association mentioned diabetic dyslipidemia as an increment of serum LDL cholesterol, and triglycerides and a decrement of serum HDL cholesterol level.[7]

Hypertriglyceridemia is common in the diabetic population due to an increase in endogenous TG synthesis caused by increased fatty acid flux. High LDL cholesterol may be detrimental to cardiovascular health due to its association with atherosclerotic cardiovascular disease. [8]

In the current study, we found a significant positive correlation of glycated hemoglobin with serum total cholesterol (0.10, 0.04) and low-density lipoprotein cholesterol (0.09, 0.02). This shows the strong correlation between glycation in diabetes with dyslipidemia. The increment of glycated hemoglobin can predict not only chronic complications like neuropathy, nephropathy, and retinopathy but also dyslipidemia.[5] A study conducted in India found no significant correlation between glycated hemoglobin with serum total cholesterol and other lipid profile parameters.[9] A study conducted in the western part by Pokharel DR et al. of Nepal showed the prevalence of dyslipidemia in the diabetic population, they revealed the increased TG, TC, LDL-C like our study.[10]

CONCLUSIONS

Our results revealed the presence of dyslipidemia in our diabetic population. Moreover, some diabetic profile parameters are significantly correlated with lipid profile test parameters. So, along with fasting blood glucose level, post-prandial blood glucose, glycated hemoglobin level lipid profile tests should be performed to assess the cardiovascular risks in type 2 diabetic patients.

LIMITATIONS

The study duration was short, follow-up of the patients was not done and the history of medications was not included in the study.

ACKNOWLEDGEMENT

The clinical laboratory service of the National Medical College and Teaching Hospital and the patients are acknowledged.

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