Original Research Paper

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Internal Medicine

A STUDY OF FASTING AND POST PRANDIAL LIPID ABNORMALITIES IN TYPE 2 DIABETES MELLITUS

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KEYWORDS :

INTRODUCTION

The worldwide prevalence of Diabetes Mellitus has risen dramatically over prevalence of type 2 diabetes mellitus is expected to rise more rapidly in the future because of increasing obesity and reduced physical activity. Type 2 diabetes mellitus is associated with the development of premature arteriosclerosis and a higher cardiovascular morbidity and mortality.[1-3]

Diabetic dyslipidaemia is believed to play a key role in pathogenesis of accelerated atherosclerosis in this condition.[4-5] The predominant lipid abnormalities seen in diabetes mellitus are an elevated serum triglyceride (TG) level and a low HDLC level.[6]

In fasting hypertriglyceridemia[5,7,8] and coronary artery disease (CAD) in diabetes mellitus, the relationship is not consistent particularly after adjusting for fasting HDLC Levels.[9] While several studies have found a significant association of postprandial phenomenon as at least with respect to lipids, we are in the postprandial phase for most of the day.[10,11] It is being increasingly believed that atherosclerosis is an independent association with CAD.[11,12] Earlier studies of postprandial lipids in diabetes mellitus have High postprandial triglycerides have shown a strong and suggested abnormalities of TG metabolism [13,14] secondary to insulin resistance [15] although results have not been consistent.

Hence this study is being carried out to find the characteristics of fasting dyslipidemia in type 2 DM and to assess the post prandial lipid levels in type 2 DM.

AIMS AND OBJECTIVES OF THE STUDY

1. To assess the nature of fasting dyslipidemia in type 2 diabetes mellitus
2. To correlate fasting dyslipidemia with severity and duration of diabetes mellitus
3. To assess the post prandial lipid abnormalities in type 2 diabetes mellitus
4. To compare the post prandial lipid abnormalities with fasting lipid load in diabetics

METHODOLOGY

Source of data: Out patients and inpatients in department of General Medicine, Mediciti Institute of Medical Sciences, Ghanpur, Medchal(dt).

Type of study: Descriptive study
Duration of study: December 2016 – June 2017
Sampling: Simple random sampling
Criteria for selection of study group:
Inclusion criteria Patients with type 2 diabetes

Exclusion criteria Type 1 diabetes, Hepatic disease, Hypothyroidism Renal disease, alcoholics Patients using medications that affect lipid metabolism (statins, beta blockers, thiazides, ocp)

Sample size: 100 patients with type 2 diabetes mellitus

Variables and measurement:
The study requires the following investigations

FBS PPBS HbA1C Renal Function tests ECG

FASTING LIPID PROFILE (after 12hours overnight overnight fast)

POST PRANDIAL LIPID PROFILE (total cholesterol, serum triglycerides, LDL, HDL, VLDL) after 6 hours standard meal.

Measurement of lipids:
Total cholesterol, HDL-C and Triglyceride levels were estimated with commercially available standard enzymatic kits.

Data entry and Statistical Analysis

- Data was entered into Microsoft Excel sheet and analysed using IBM SPSS Statistics for Windows, Version 22.0.
- Descriptive statistics were expressed as Means and percentages
- Inferential statistical analysis was done using chi-square test for categorical variables and ANOVA tests for continuous variables

P-value of <0.05 will be considered statistically significant

OBSERVATIONS AND RESULTS

Table 1: Age distribution of the cases

Age Group(Year)	Number	Percentage
21-30	4	4
31-40	21	21
41-50	38	38
51-60	32	32
61-70	5	5
Total	100	100

In this study, the study group constituted cases between the age 21 to 70 years. Most of cases were in the age group of 41 to 50 years which constituted 38% of total, followed by persons in the age group 51 to 60 years who constituted about 32% of the total study.

Graph 1: Showing the age distribution of the cases

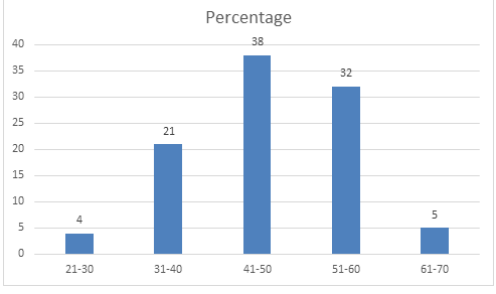


Table 2: Gender wise distribution of cases

Sex	Number	Percentage
Male	59	59
Female	41	41
Total	100	100

In this study, 59 patients were males and 41 patients were females.

Graph 2: showing the sex wise distribution of the cases

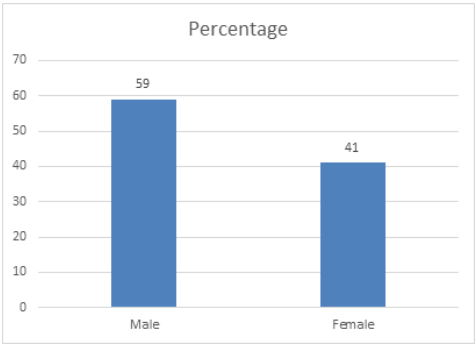
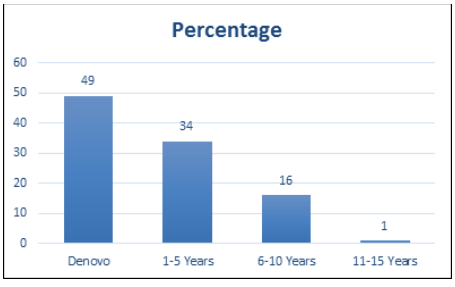


Table 3: Duration of diabetes among study group

Duration of Diabetes	Cases	Percentage
Denovo	49	49
1-5 Years	34	34
6-10 Years	16	16
11-15 Years	1	1
Total	100	100%

Graph 3: graph showing duration of diabetes among the study group



In this study 49% of cases were newly detected type 2 diabetes, whereas 34 % of cases had diabetes for 1-5 years, 16 % of cases had diabetes for 6-10 years and 1% of cases had diabetes for 11-15 years.

Table 4: Tests for nature of diabetes mellitus

Tests	Minimum(mg/dl)	Maximum(mg/dl)	Mean	Std. Deviation
FBS	86	460	201.19	78.32
PPBS	156	541	291.19	73.786
RBS	156	580	300.21	81.903
HbA1C	6.4	14.5	9.0898	1.96515

In this study, the nature of diabetes among the cases was studied.

The minimum fasting blood sugar was 86 mg/dl and the maximum was 460 mg/dl; the mean fasting blood sugar was 201.19 and the standard deviation was 78.32.

The minimum post prandial blood sugar was 156 mg/dl and the maximum was 541 mg/dl; the mean post prandial blood sugar was 291.19 and standard deviation was 73.786.

The minimum random blood sugar was 156 mg/dl and the maximum was 580 mg/dl; the mean random blood sugar was 300.21 and the standard deviation was 81.903.

The minimum HbA1C was 6.4 and the maximum was 14.5: the mean HbA1C was 9.0898 and the standard deviation was 1.96515.

Table 5: Nature of fasting dyslipidaemia in type 2 diabetes mellitus patients

Fasting Lipid Profile	Minimum (mg/dl)	Maximum (mg/dl)	Mean (mg/dl)	Std. Deviation
F.TC	82	301	172.3	40.7816
F.TG	35	490	161.87	81.1047
F.HDL-C	17	71	40.12	10.3351
F.LDL-C	11	214	97.892	36.0828
F. VLDL-C	7	126	34.392	22.6993

In this study, the nature of fasting lipid profile among the type 2 diabetes mellitus patients was as follows. The minimum fasting total cholesterol was 82 mg/dl and the maximum was 30 mg/dl; the mean fasting total cholesterol was 172.3 mg/dl and standard deviation was 40.7816.

The minimum fasting triglyceride levels was 35 mg/dl and the maximum was 490 mg/dl; the mean fasting triglyceride level was 161.87 mg/dl and the standard deviation was 81.1047.

The minimum fasting high density lipoprotein cholesterol level was 17 mg/dl and the maximum was 71 mg/dl; the mean fasting HDL-cholesterol was 40.12 mg/dl and the standard deviation was 10.3351.

The minimum fasting low density lipoprotein cholesterol was 11 mg/dl and the maximum was 214 mg/dl; the mean fasting LDL-cholesterol was 97.892 and the standard deviation was 36.0828.

The minimum fasting very low-density lipoprotein cholesterol was 7 mg/dl and the maximum was 126 mg/dl; the mean fasting VLDL cholesterol was 34.392 mg/dl and the standard deviation was 22.6993.

Table 6: Distribution of Fasting total cholesterol in the present study

Total cholesterol(mg/dl)	Frequency	Percent
0-200	75	75
201-239	20	20
>240	5	5
Total	100	100

In the present study ,75% of the patients were having fasting total cholesterol in the desirable range (<200 mg/dl); 20% were in borderline high range (201-239 mg/dl) and 5% had high (> 240 mg/dl) total cholesterol levels.

Graph 4: showing the distribution of fasting total cholesterol in present study

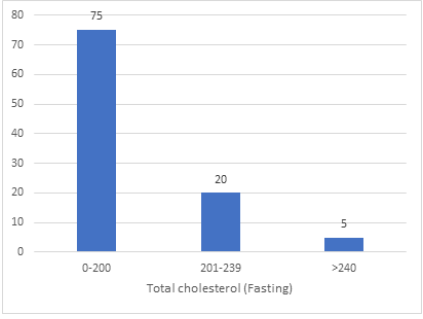


Table 7: Distribution of Fasting triglycerides in the present study:

Total cholesterol(mg/dl)	Frequency	Percent
0-150	51	51
151-200	24	24
201-500	25	25
Total	100	100

In the present study,51% of patients were having fasting triglyceride levels in desirable (<150 mg/dl) range; 24% were in borderline high (151-200 mg/dl) range; 25% of patients were having high (200-500 mg/dl) triglyceride levels.

Graph 5: showing the distribution of fasting triglycerides in present study:

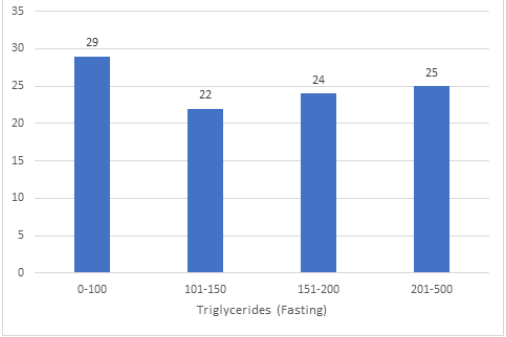


Table 8: Distribution of Fasting HDL Cholesterol in the present study:

HDL cholesterol (Fasting)	Frequency	Percent
0-40	53	53
41-60	44	44
>60	3	3
Total	100	100

In the present study, 44% of the patients were having fasting HDL cholesterol in the desirable range (41-60 mg/dl); 53% of patients were in major risk (0-40 mg/dl) category for CHD and 3% were in minor risk (>60 mg/dl) category for CHD.

Graph 6: showing the distribution of fasting HDL cholesterol in present study:

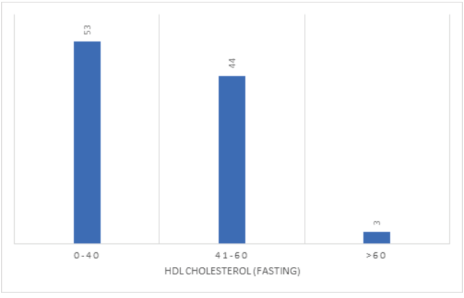


Table 9: Distribution of Fasting LDL Cholesterol in the present study:

LDL cholesterol (Fasting)	Frequency	Percent
0-100	56	56
101-130	26	26
131-160	12	12
161-190	5	5
>190	1	1
Total	100	100

In the present study, 56% of patients were having fasting LDL cholesterol levels in desirable range (<100 mg/dl); 26% were in near desirable range (101-130 mg/dl); 12% were in borderline high range (131-160 mg/dl); 5% were having high LDL cholesterol (161-190 mg/dl); 1%had very high LDL cholesterol (>190 mg/dl);

Graph 7: showing the distribution of fasting LDL cholesterol in present study

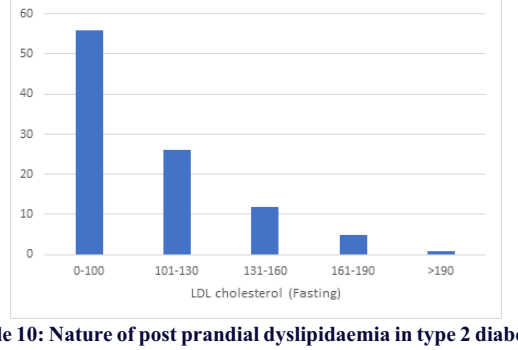


Table 10: Nature of post prandial dyslipidaemia in type 2 diabetes mellitus

Lipid profile	Minimum (mg/dl)	Maximum (mg/dl)	Mean (mg/dl)	Std. Deviation
PP.TC	78	320	179.93	49.444
PP.TG	39	660	210.6	110.785
PP.HDL-C	18	67	38.02	9.573
PP.LDL-C	21	230	101.93	40.452
PP. VLDL-C	7.8	132.2	43.442	25.8079

In this study, the nature of post prandial lipid profile among the type 2 diabetes mellitus patients was as follows. The minimum post prandial total cholesterol was 78 mg/dl and the maximum was 320 mg/dl, the mean post prandial total cholesterol was 179.93 mg/dl and standard deviation was 49.444.

The minimum post prandial triglyceride levels were 39 mg/dl and the maximum was 660 mg/dl; the mean post prandial triglyceride level was 210.6 mg/dl and the standard deviation was 110.785.

The minimum post prandial high-density lipoprotein cholesterol level was 18 mg/dl and the maximum was 67 mg/dl; the mean post prandial HDL-cholesterol was 38.02 mg/dl and the standard deviation was 9.573.

The minimum post prandial low-density lipoprotein cholesterol was 21 mg/dl and the maximum was 230 mg/dl; the mean post prandial LDL-cholesterol was 101.93 and the standard deviation was 40.492.

The minimum post prandial very low-density lipoprotein cholesterol was 7.8 mg/dl and the maximum was 132.2 mg/dl; the mean post prandial VLDL cholesterol was 43.442 mg/dl and the standard deviation was 25.8079.

Table 11: Distribution of post prandial total Cholesterol in the present study

Total cholesterol (post prandial)	Frequency	Percent
0-200	65	65
201-239	25	25
>240	10	10
Total	100	100

In the present study ,65% of the patients were having post prandial total cholesterol in the desirable range (<200 mg/dl); 25% were in borderline high range (201-239 mg/dl) and 10% had high (> 240 mg/dl) total cholesterol levels.

Graph 8: Distribution of post prandial total Cholesterol in the present study

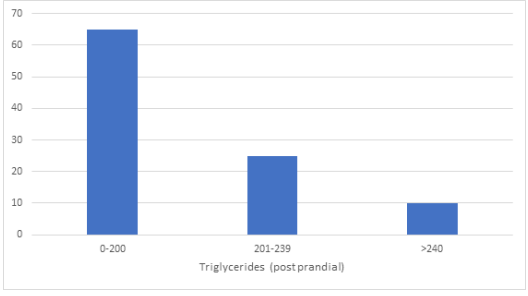


Table 12: Distribution of post prandial triglycerides in the present study:

Triglycerides (post prandial)	Frequency	Percent
0-150	29	29
151-200	25	25
201-500	44	44
>500	2	2
Total	100	100

In the present study,29% of patients were having post prandial triglyceride levels in desirable (<150 mg/dl) range; 25% were in borderline high (151-200 mg/dl) range; 44% of patients were having high (200-500 mg/dl) triglyceride levels; 2% of patients had very high (>500 mg/dl) postprandial triglyceride levels.

Graph 9: Distribution of post prandial triglycerides in the present study

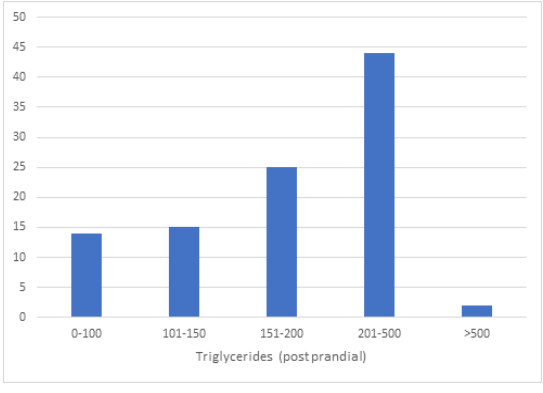


Table 13: Distribution of post prandial HDL Cholesterol in the present study:

HDL cholesterol (post prandial)	Frequency	Percent
0-40	63	63
41-60	35	35
>60	2	2
Total	100	100

In the present study, 63% of the patients were having post prandial HDL cholesterol in the desirable range (41-60 mg/dl); 35% of patients were in major risk (0-40 mg/dl) category for CHD and 2% were in minor risk (>60 mg/dl) category for CHD.

Graph 10: Distribution of post prandial HDL Cholesterol in the present study:

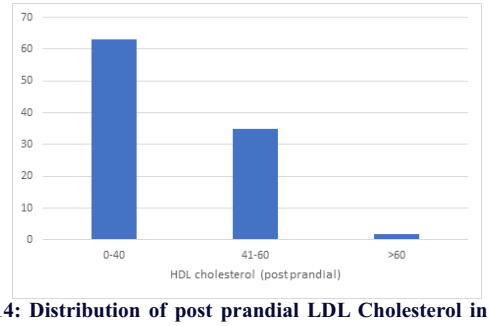
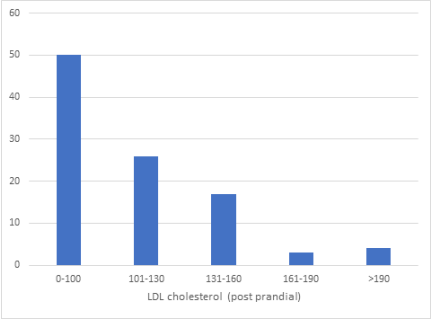


Table 14: Distribution of post prandial LDL Cholesterol in the present study:

HDL cholesterol (post prandial)	Frequency	Percent
0-100	50	50
101-130	26	26
131-160	17	17
161-190	3	3
>190	4	4
Total	100	100

Graph 11: Distribution of post prandial LDL Cholesterol in the present study:



In the present study, 50% of patients were having fasting LDL cholesterol levels in desirable range (<100 mg/dl); 26% were in near desirable range (101-130 mg/dl); 17% were in borderline high range (131-160 mg/dl); 3% were having high LDL cholesterol (161-190 mg/dl); 1% had very high LDL cholesterol (>190 mg/dl);

Correlation of Age with Fasting and Post Prandial Lipids

Table 15: Age Correlation with Fasting Lipid Profile

Test	Mean	Pearson Correlation Coefficient	p-value
Age	47.04	1	
F.TC	172.3	-0.05	0.619
F.TG	161.87	0.02	0.845
F.HDL-C	40.12	0.106	0.296
F.LDL-C	97.892	0.069	0.496
F. VLDL-C	34.392	-0.017	0.865

**Correlation is significant at the 0.01 level (2-tailed)
*Correlation is significant at the 0.05 level (2-tailed)

Table 16: Age Correlation with Post Prandial Lipid Profile:

Test	Mean	Pearson Correlation Coefficient	p-value
Age	47.04	1	
PP.TC	179.93	-0.097	0.337
PP.TG	210.6	0.018	0.856
PP.HDL-C	38.02	0.073	0.47
PP.LDL-C	101.93	0.073	0.472
PP. VLDL-C	43.442	0.038	0.705

**Correlation is significant at the 0.01 level (2-tailed)
*Correlation is significant at the 0.05 level (2-tailed)

In this study group, the mean age was 47.04 years. The mean fasting total cholesterol was 172.3 and the pearson co efficient was -0.05 which has negative correlation with age and it was not significant (p-value was 0.619); the mean post prandial total cholesterol was 179.93 mg/dl and the pearson co efficient was -0.097 which has negative correlation with age and it was not significant (p-value was 0.337).

The mean fasting triglyceride was 161.87 mg/dl and the pearson co efficient was 0.02 which has positive correlation with age but it was not significant (p- value was 0.845); the mean post prandial total cholesterol was 210.6 mg/dl and the pearson co efficient was 0.018 which has positive correlation with age but it was not significant (p-value was 0.856).

The mean fasting HDL cholesterol was 40.12 mg/dl and the pearson co efficient was 0.106 which has positive correlation with age but, it was not significant (p- value was 0.296); the mean post prandial HDL cholesterol was 38.02 mg/dl and the pearson co efficient was 0.073 which has positive correlation with age but it was not significant (p-value was 0.47).

The mean fasting LDL cholesterol was 97.892 mg/dl and the pearson co efficient was 0.069 which has positive correlation with age but it was not significant (p- value was 0.496); the mean post prandial LDL cholesterol was 101.93 mg/dl and the pearson co efficient was 0.073 which has positive correlation with age but it was not significant (p-value was 0.472).

The mean fasting VLDL cholesterol was 34.392 mg/dl and the pearson co efficient was -0.017 which has negative correlation with age and it was not significant (p- value was 0.865); the mean post prandial VLDL cholesterol was 43.442 mg/dl and the pearson co efficient was 0.038 which has positive correlation with age but it was not significant (p-value was 0.705).

Correlation of FBS with Fasting and Post Prandial Lipids

Table 17: FBS Correlation with Fasting Lipid Profile

Test	Mean	Pearson Correlation Coefficient	p-value
FBS	**201.19**	**1**	
F.TC	**172.3**	**0.267****	**0.007**
F.TG	**161.87**	**0.249***	**0.013**
F.HDL-C	**40.12**	**-0.259****	**0.009**
F.LDL-C	**97.892**	**0.242***	**0.015**
F. VLDL-C	**34.392**	**0.121**	**0.23**

**Correlation is significant at the 0.01 level (2-tailed)
*Correlation is significant at the 0.05 level (2-tailed)

Table 18: FBS Correlation with Post Prandial Lipid Profile

Test	Mean	Pearson Correlation Coefficient	p-value
FBS	201.19	1	
PP.TC	179.93	.296**	0.003
PP.TG	210.6	.229*	0.022
PP.HDL-C	38.02	-.222*	0.026
PP.LDL-C	101.93	.209*	0.037
PP. VLDL-C	43.442	0.118	0.243

**Correlation is significant at the 0.01 level (2-tailed)
*Correlation is significant at the 0.05 level (2-tailed)

In this study group, the mean fasting blood sugar was 201 mg/dl. The mean fasting total cholesterol was 172.3 and the pearson co efficient was 0.267 which has positive correlation with FBS and it was significant (p- value was 0.007); the mean post prandial total cholesterol was 179.93 mg/dl and the pearson co efficient was 0.296 which has positive correlation with FBS and it was significant (p-value was 0.003).

The mean fasting triglyceride was 161.87 mg/dl and the pearson co efficient was 0.249 which has positive correlation with FBS and it was significant (p- value was 0.013); the mean post prandial total cholesterol was 210.6 mg/dl and the pearson co efficient was 0.229

which has positive correlation with FBS and it was significant (p-value was 0.022).

The mean fasting HDL cholesterol was 40.12 mg/dl and the pearson co efficient was -0.259 which has negative correlation with FBS and it was significant (p- value was 0.009); the mean post prandial HDL cholesterol was 38.02 mg/dl and the pearson co efficient was -0.222 which has negative correlation with FBS and it was significant (p-value was 0.026).

The mean fasting LDL cholesterol was 97.892 mg/dl and the pearson co efficient was 0.242 which has positive correlation with FBS and it was significant (p- value was 0.015); the mean post prandial LDL cholesterol was 101.93 mg/dl and the pearson co efficient was 0.209 which has positive correlation with FBS and it was significant (p-value was 0.037).

The mean fasting VLDL cholesterol was 34.392 mg/dl and the pearson co efficient was 0.121 which has positive correlation with FBS and it was not significant and the p- value was 0.23; the mean post prandial VLDL cholesterol was 43.442 mg/dl and the pearson co efficient was 0.118 which has positive correlation with FBS and it was not significant (p-value was 0.243).

Correlation of PPBS with Fasting and Post Prandial Lipids

Table 19: PPBS Correlation with Fasting Lipid Profile

Test	Mean	Pearson Correlation Coefficient	p-value
PPBS	291.19	1	
F.TC	172.3	0.238*	0.017
F.TG	161.87	0.351**	0
F.HDL-C	40.12	-0.185	0.065
F.LDL-C	97.892	0.278**	0.005
F. VLDL-C	34.392	0.185	0.065

**Correlation is significant at the 0.01 level (2-tailed)
*Correlation is significant at the 0.05 level (2-tailed)

Table 20: PPBS Correlation with Post Prandial Lipid Profile

Test	Mean	Pearson Correlation Coefficient	p-value
PPBS	291.19	1	
PP.TC	179.93	0.206*	0.04
PP.TG	210.6	0.259**	0.009
PP.HDL-C	38.02	-0.207*	0.039
PP.LDL-C	101.93	0.16	0.113
PP. VLDL-C	43.442	0.189	0.06

**Correlation is significant at the 0.01 level (2-tailed)
*Correlation is significant at the 0.05 level (2-tailed)

In this study group, the mean post prandial blood sugar was 201 mg/dl.
The mean fasting total cholesterol was 172.3 and the pearson co efficient was 0.238 which has positive correlation with PPBS and it was significant (p- value was 0.017); the mean post prandial total cholesterol was 179.93 mg/dl and the pearson co efficient was 0.206 which has positive correlation with PPBS and it was significant (p-value was 0.004).

The mean fasting triglyceride was 161.87 mg/dl and the pearson co efficient was 0.351 which has positive correlation with PPBS and it was significant (p- value was 0); the mean post prandial triglyceride was 210.6 mg/dl and the pearson co efficient was 0.259 which has positive correlation with PPBS and it was significant (p-value was 0.009).

The mean fasting HDL cholesterol was 40.12 mg/dl and the pearson co efficient was -0.185 which has negative correlation with PPBS and it was not significant (p- value was 0.065); the mean post prandial HDL cholesterol was 38.02 mg/dl and the pearson co efficient was -0.207 which has negative correlation with PPBS and it was significant (p-value was 0.039).

The mean fasting LDL cholesterol was 97.892 mg/dl and the pearson co efficient was 0.278 which has positive correlation with PPBS and it was significant (p- value was 0.005); the mean post prandial LDL cholesterol was 101.93 mg/dl and the pearson co efficient was 0.16 which has positive correlation with PPBS and it was not which has positive correlation with PPBS and it was significant significant (p-value was 0.113).

The mean fasting VLDL cholesterol was 34.392 mg/dl and the pearson co efficient was 0.185 which has positive correlation with PPBS and it was not significant (p- value was 0.065); the mean post prandial VLDL cholesterol was 43.442 mg/dl and the pearson co efficient was 0.189 which has positive correlation with PPBS and it was not significant (p-value was 0.06).

Correlation of RBS with Fasting and Post Prandial Lipids

Table 21: RBS Correlation with Fasting Lipid Profile

Test	Mean	Pearson Correlation Coefficient	p-value
RBS	300.21	1	
F.TC	172.3	0.319**	0.001
F.TG	161.87	0.342**	0.001
F.HDL-C	40.12	-0.239*	0.016
F.LDL-C	97.892	0.314**	0.001
F. VLDL-C	34.392	0.344**	0

**Correlation is significant at the 0.01 level (2-tailed)
*Correlation is significant at the 0.05 level (2-tailed)

Table 22: RBS Correlation with Post Prandial Lipid Profile

Test	Mean	Pearson Correlation Coefficient	p-value
RBS	300.21	1	
PP.TC	179.93	0.215*	0.032
PP.TG	210.6	0.360**	0
PP.HDL-C	38.02	-0.176	0.079
PP.LDL-C	101.93	0.262**	0.009
PP. VLDL-C	43.442	0.315**	0.001

**Correlation is significant at the 0.01 level (2-tailed)
*Correlation is significant at the 0.05 level (2-tailed)

In this study group, the mean random blood sugar was 300.21 mg/dl.

The mean fasting total cholesterol was 172.3 and the pearson co efficient was 0.319 which has positive correlation with RBS and it was significant (p- value was 0.001); the mean post prandial total cholesterol was 179.93 mg/dl and the pearson co efficient was 0.215 which has positive correlation with RBS and it was significant (p-value was 0.032).

The mean fasting triglyceride was 161.87 mg/dl and the pearson co efficient was 0.342 which has positive correlation with RBS and it was significant (p- value was 0.001); the mean post prandial triglyceride was 210.6 mg/dl and the pearson co efficient was 0.360 which has positive correlation with RBS and it was significant (p-value was 0).

The mean fasting HDL cholesterol was 40.12 mg/dl and the pearson co efficient was -0.239 which has neagative correlation with RBS and it was significant and the (p- value was 0.016); the mean post prandial HDL cholesterol was 38.02 mg/dl and the pearson co efficient was -0.176 which has negative correlation with RBS and it was not significant (p-value was 0.079).

The mean fasting LDL cholesterol was 97.892 mg/dl and the pearson co efficient was 0.314 which has positive correlation with RBS and it was significant (p- value was 0.001); the mean post prandial LDL cholesterol was 101.93 mg/dl and the pearson co efficient was 0.262 which has positive correlation with RBS and it was significant (p-value) was 0.009.

The mean fasting VLDL cholesterol was 34.392 mg/dl and the pearson co efficient was 0.344 which has positive correlation with RBS and it was significant (p- value was 0); the mean post prandial VLDL cholesterol was 43.442 mg/dl and the pearson co efficient was 0.315 which has positive correlation with RBS and it was significant (p-value was 0.001).

Correlation of HbA1C with Fasting and Post Prandial Lipids

Table 23: HbA1C Correlation with Fasting Lipid Profile

Test	Mean	Pearson Correlation Coefficient	p-value
HbA1C	9.0898	1	
F.TC	172.3	0.421**	0
F.TG	161.87	0.388**	0
F.HDL-C	40.12	-0.280**	0.005
F.LDL-C	97.892	0.414**	0
F. VLDL-C	34.392	0.268**	0.007

**Correlation is significant at the 0.01 level (2-tailed)
*Correlation is significant at the 0.05 level (2-tailed)

Table 24: HbA1C Correlation with Post Prandial Lipid Profile

Test	Mean	Pearson Correlation Coefficient	p-value
HbA1C	9.0898	1	
PP.TC	179.93	0.355**	0
PP.TG	210.6	0.328**	0.001
PP.HDL-C	38.02	-0.232*	0.02
PP.LDL-C	101.93	0.342**	0
PP. VLDL-C	43.442	0.236*	0.018

**Correlation is significant at the 0.01 level (2-tailed)
*Correlation is significant at the 0.05 level (2-tailed)

In this study group, the mean HbA1C was 9.0898. The mean fasting total cholesterol was 172.3 and the pearson co efficient was 0.421 which has positive correlation with HbA1C and was significant (p-value was 0). The mean post prandial total cholesterol was 179.93 mg/dl and the pearson co efficient was 0.355 which has positive correlation with HbA1C and was significant (p-value was 0).

The mean fasting triglyceride was 161.87 mg/dl and the pearson co efficient was 0.388 which has positive correlation with HbA1C and was significant (p- value was 0); the mean post prandial triglyceride was 210.6 mg/dl and the pearson co efficient was 0.328 which has positive correlation with HbA1C and was significant (p-value was 0.001).

The mean fasting HDL cholesterol was 40.12 mg/dl and the pearson co efficient was -0.280 and the p- value was 0.005; the mean post prandial HDL cholesterol was 38.02 mg/dl and the pearson co efficient was -0.232 and p-value was 0.02.

The mean fasting LDL cholesterol was 97.892 mg/dl and the pearson co efficient was 0.414 which has positive correlation with HbA1C and was significant (p- value was 0); the mean post prandial LDL cholesterol was 101.93 mg/dl and the pearson co efficient was 0.342 which has positive correlation with HbA1C and was significant (p-value was 0).

The mean fasting VLDL cholesterol was 34.392 mg/dl and the pearson co efficient was 0.268 which has positive correlation with HbA1C and was significant (p- value was 0); the mean post prandial VLDL cholesterol was 43.442 mg/dl and the pearson co efficient was 0.236 which has positive correlation with HbA1C and was significant (p-value was 0.018).

Correlation of T2DM with fasting and post prandial lipids

Table 25: Duration of Diabetes Correlation with Fasting Lipid Profile

Test	Mean	Pearson Correlation Coefficient	p-value
Diabetes (Yrs)	2.45	1	
F.TC	172.3	-0.107	0.288
F.TG	161.87	0.048	0.632
F.HDL-C	40.12	0.066	0.517
F.LDL-C	97.892	-0.007	0.947
F. VLDL-C	34.392	0.037	0.716

**Correlation is significant at the 0.01 level (2-tailed)
*Correlation is significant at the 0.05 level (2-tailed)

Table 26: Duration of Diabetes Correlation with Post Prandial Lipid Profile

Test	Mean	Pearson Correlation Coefficient	p-value
Diabetes (Yrs)	2.45	1	
PP.TC	179.93	-0.192	0.056
PP.TG	210.6	-0.033	0.745
PP.HDL-C	38.02	0.033	0.743
PP.LDL-C	101.93	0.034	0.737
PP. VLDL-C	43.442	0.046	0.647

In this study group, the mean duration of diabetes was 2.45 years. The mean fasting total cholesterol was 172.3 and the pearson co efficient was -0.107 which has negative correlation with duration of diabetes and has weak or negligible significance (p- value was 0.288); the mean post prandial total cholesterol was 179.93 mg/dl and the pearson co efficient was -0.192 which has negative correlation with duration of diabetes and has weak significance (p-value was 0.056).

The mean fasting triglyceride was 161.87 mg/dl and the pearson co efficient was 0.048 which has positive correlation with duration of diabetes and was weak or negligible significance (p- value was 0.632). the mean post prandial triglyceride was 210.6 mg/dl and the pearson co efficient was -0.033 which has negative correlation with duration of diabetes and was not significant (p-value was 0.745).

The mean fasting HDL cholesterol was 40.12 mg/dl and the pearson co efficient was 0.066 and the p- value was 0.517; the mean post prandial HDL cholesterol was 38.02 mg/dl and the pearson co efficient was 0.033 and p-value was 0.743.

The mean fasting LDL cholesterol was 97.892 mg/dl and the pearson co efficient was -0.007 which has negative correlation with duration of diiabetes and has weak or negligible significance (p- value was 0947); the mean post prandial LDL cholesterol was 101.93 mg/dl and the pearson co efficient was 0.034 which has positive correlation with duration of diabetes and has weak or negligible significance (p-value was 0.737).

The mean fasting VLDL cholesterol was 34.392 mg/dl and the pearson co efficient was 0.037 which has positive correlation with duration of diabetes and has weak or negligible significance (p- value was 0.716); the mean post prandial VLDL cholesterol was 43.442 mg/dl and the pearson co efficient was 0.046 which has positive correlation with HbA1C and has weak or negligible significance (p-value was 0.647).

CONCLUSION

Lot of studies in the past were done to find out the correlation between fasting and post prandial dyslipidemias with relation to the duration and severity of diabetes and the results found were not on the same note. The main objective of this study is the assess the nature of dyslipidemias seen in diabetes mellitus and to correlate both fasting and post prandial dyslipidemias with the duration of the diabetes and severity of the diabetes in terms of HBA1C, RBS, FBS AND PPBS.

- This study found that age has no statistically significant correlation with fasting and post prandial cholesterol levels (p>0.05).
- FBS has significant positive correlation with fasting total cholesterol, fasting triglycerides and fasting LDL (p<0.05) and, negative correlation with fasting HDL (p>0.05).
- PPBS has significant positive correlation with fasting total cholesterol, fasting triglycerides and fasting LDL (p<0.05).
- RBS has significant positive correlation with fasting total cholesterol, fasting triglycerides and fasting LDL, fasting VLDL (p<0.05) and, negative correlation with fasting HDL (p>0.05).
- HBA1C has significant positive correlation with fasting total cholesterol, fasting triglycerides and fasting LDL, fasting VLDL (p<0.05) and, negative correlation with fasting HDL (p>0.05).

This study found duration of diabetes has no statistically significant correlation with fasting and post prandial cholesterol levels (p>0.05).

SUMMARY

- This is a hospital based descriptive type of observational study done in Mediciti Institute of Medical Sciences, Ghanpur, during the period of 2016-2017 with a sample population of 100 patients.
- In this study, 59 patients were males and 41 patients were females
- In this study 49% of cases were newly detected type 2 diabetes, whereas 34 % of cases had diabetes for 1-5 years, 16 % of cases had diabetes for 6-10 years and 1% of cases had diabetes for 11-15 years.
- Mean age of the study population is 47.04 years with a standard deviation of 8.91
- The mean fasting cholesterol, fasting triglycerides, fasting HDL, fasting LDL and fasting VLDL are 172.3, 161.87, 40.12, 97.89 and 34.39 respectively in mg/dl
- In the present study ,75% of the patients were having fasting total cholesterol in the desirable range (<200 mg/dl); 20% were in borderline high range (201-239 mg/dl) and 5% had high (> 240 mg/dl) total cholesterol levels.
- In the present study,51% of patients were having fasting triglyceride levels in desirable (<150 mg/dl) range; 24% were in borderline high (151-200 mg/dl) range; 25% of patients were having high (200-500 mg/dl) triglyceride levels.
- The mean post prandial cholesterol, post prandial triglycerides, post prandial HDL, post prandial LDL and post prandial VLDL are 179.9, 210.6, 38.0, 101.9 and 43.4 respectively in mg/dl
- In the present study ,65% of the patients were having post prandial total cholesterol in the desirable range (<200 mg/dl); 25% were in

borderline high range (201-239 mg/dl) and 10% had high (> 240 mg/dl) total cholesterol levels.

- In the present study,29% of patients were having post prandial triglyceride levels in desirable (<150 mg/dl) range; 25% were in borderline high (151-200 mg/dl) range; 44% of patients were having high (200-500 mg/dl) triglyceride levels.
- This study found that age has no statistically significant correlation with fasting and post prandial cholesterol levels.
- FBS has significant positive correlation with fasting total cholesterol, fasting triglycerides and fasting LDL and, negative correlation with fasting HDL.
- PPBS has significant positive correlation with fasting total cholesterol, fasting triglycerides and fasting LDL.
- RBS has significant positive correlation with fasting total cholesterol, fasting triglycerides and fasting LDL, fasting VLDL and, negative correlation with fasting HDL.
- HBA1C has significant positive correlation with fasting total cholesterol, fasting triglycerides and fasting LDL, fasting VLDL and, negative correlation with fasting HDL.
- This study found duration of diabetes has no statistically significant correlation with fasting and post prandial cholesterol levels.

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