Section: General Medicine

Original Research Article

STUDY OF LIPID PROFILE IN TYPE-2 DIABETES MELLITUS PATIENTS PRESENTING TO A TERTIARY CARE CENTRE

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Abstract

Background: The lipid abnormalities are prevalent in diabetes mellitus because insulin resistance or deficiency affects key enzymes and pathways in lipid metabolism. This study was planned to determine the lipid profile in patients of type-2 diabetes in tertiary care centre in Uttarakhand. **Materials and Methods:** This was a cross-sectional, hospital based study conducted on 110 patients with diabetes mellitus (age>16 years) in Department of General Medicine, Dr Shushila Tewari Memorial Hospital, Haldwani, Uttarakhand. Serum triglyceride, LDL, VLDL, cholesterol and HDL were noted for each diabetic patient. All the data was tabulated and subjected to statistical analysis. **Result:** Out of total 110 type 2 diabetes mellitus patients, 87.3% (96) had dyslipidemia and remaining 12.7% (14) had normal lipid profile. The mean age of participants with dyslipidemia was 58.10 ± 8.98 years. The participants with dyslipidemia comprised of 58.3% males and 41.7% females. The mean total cholesterol, triglyceride and LDL were significantly higher in participants with poor glycaemic control ($p<0.05$). The mean HDL was significantly lower in participants with poor glycaemic control ($p<0.05$). **Conclusion:** Dyslipidaemia is highly prevalent in diabetics, both males and females and in particular more prevalent in those with poorly controlled diabetes. Common lipid abnormalities in diabetes are raised triglycerides, raised serum LDL, raised serum cholesterol and low serum HDL. It is recommended that lipid profile of patients with diabetes should be done at regular intervals.

INTRODUCTION

Diabetes mellitus (DM) is a common metabolic disorder characterized by absolute or relative deficiencies in insulin secretion and/or insulin action associated with chronic hyperglycemia and disturbances of carbohydrate, lipid and protein metabolism.[1]

The lipid abnormalities are prevalent in diabetes mellitus because insulin resistance or deficiency affects key enzymes and pathways in lipid metabolism. The term diabetic dyslipidemia comprises a triad of raised triglycerides, reduced high density lipoprotein (HDL) and excess of small, dense low-density lipoprotein (LDL) particles.[2] Lipid abnormalities associated with diabetes are termed as dyslipidaemia rather than hyperlipidaemia because there may be changes in both quantity and quality of the lipoproteins.[3]

Dyslipidemia is a disorder which arises as a result of abnormalities in the plasma lipoproteins. The lipid abnormalities in diabetes include quantitative changes which occur due to an increase of glucose for very low-density lipoprotein (VLDL) synthesis and decrease in lipoprotein lipase activity leading to decrease of VLDL from peripheral circulation, increase in low density lipoprotein-C (LDL-C) levels and decrease in high density lipoprotein C (HDLC) levels due to increase in hepatic activity decrease in VLDL clearance. Qualitative changes consists of increase of triglyceride (TG), LDL-C and HDL-C, non-enzymatic glycation of LDL and non-enzymatic glycation of high density lipoprotein (HDL).[4] Due to the abnormalities in lipoproteins, diabetes mellitus is associated with cardiovascular and cerebrovascular morbidity and mortality worldwide.[5] Dyslipidemia affects approximately 70% to 97% of people with diabetes.[6]

Early detection and treatment of hyperlipidemia in patients with type- 2 diabetes can prevent the progression of cardiovascular disease associated with atherogenic abnormalities and minimize the risk for Coronary artery disease. There is paucity of data regarding lipid profile of type 2 diabetes patients in North Indian Region, hence the present study was

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planned to study the lipid profile in patients of type-2 diabetes in tertiary care centre in Uttarakhand.

MATERIALS AND METHODS

This was a cross-sectional, hospital based study conducted on 110 patients with diabetes mellitus in Department of General Medicine, Dr Shushila Tewari Memorial Hospital, Haldwani, Uttarakhand.

Inclusion Criteria

- Age >16 years.
- Patients with type2DM.
- Giving consent for participation.

Exclusion Criteria

- Patients with type 1DM.
- Patients with hypothyroidism.
- Patients with primary hyperlipidemic disorder.
- Patients with severe systemic disease including hypertension, cardiac and renal disease.
- Patients with malignancy.
- Pregnancy with gestational DM
- Patients on treatment for dyslipidemia.
- Patients not giving the consent for study

Dyslipidemia was defined as any one of the following:

- Total cholesterol level > 240 mg/dl.
- Triglyceride level > 150 mg/dl.
- Low density lipoprotein cholesterol level > 140 mg/dl.
- High density lipoprotein cholesterol level <40 mg/dl.

All the data was tabulated and subjected to statistical analysis.

RESULTS

Table 1: Patient Characteristics

Patient Characteristics		Number	Percentage
Age Group (Years)	31-40	2	1.8%
	41-50	23	20.9%
	51-60	44	40%
	61-70	34	30.9%
	>70	7	6.4%
Gender	Male	64	58.2%
	Female	46	41.8%
Residence	Rural	59	53.6%
	Urban	51	46.4%
Socioeconomic Status	Upper Class	2	1.8%
	Upper Middle	16	14.5%
	Lower Middle	49	44.5%
	Upper Lower	25	22.7%
	Lower	18	16.5%
Duration Of Daibetes (Years)	<5	37	33.6%
	≥5	73	66.4%

Table 2: Distribution of Laboratory parameters

Laboratory parameters		Range	Number	Percentage
Blood sugar	Fasting blood sugar (mg/dl)	126 - 140	19	17.3%
		>140	91	92.7%
	Post prandial blood sugar (mg/dl)	200 - 300	60	54.5%
		>300	50	45.5%
Glycaemic control	Good	Hba1c <7%	16	14.5%
	Poor	Hba1c >7%	94	85.5%
Lipid profile	Total cholesterol (mg/dl)	<240	61	55.5%
		≥240	49	44.5%
	Triglyceride (mg/dl)	<150	24	21.8%
		≥150	86	78.2%
	Ldl (mg/dl)	<140	79	71.8%
		≥140	31	28.2%
	Vldl (mg/dl)	<40	26	23.6%
		≥40	84	76.4%
	Hdl (mg/dl)	≤40	82	74.5%
		>40	28	25.5%

In the present study, out of total 110 type 2 diabetes mellitus patients, 87.3% (96) had dyslipidemia and remaining 12.7% (14) had normal lipid profile.

Table 3: Characteristics of patients with Dyslipidemia

Characteristics		Number (n=96)	Percentage
Age group (years)	31-40	2	2.1%
	41-50	18	18.8%
	51-60	39	40.6%
	61-70	30	31.3%
	>70	7	7.2%

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Gender	Male	56	58.3%
	Female	40	41.7%
Residence	Rural	52	54.2%
	Urban	44	45.8%
Socioeconomic status	Upper class	2	2.1%
	Upper middle	15	15.6%
	Lower middle	42	43.8%
	Upper lower	22	22.9%
	Lower	15	15.6%
Glycaemic control	Good	6	6.2%
	Poor	90	93.8%

Table 4: Comparison of Lipid Profile based on Glycaemic Control

Lipid profile	Good glycaemic control (hba1c<7%) N=16	Poor glycaemic control (hba1c>7%) N=94	P value
Mean total cholesterol(mg/dl)	200.88 ± 32.44	228.30 ± 33.15	0.0027
Mean ldl (mg/dl)	112.00 ± 17.61	128.94 ± 17.40	0.0005
Mean triglyceride (mg/dl)	181.50 ± 64.25	243.36 ± 64.03	0.0005
Mean hdl (mg/dl)	39.75 ± 4.77	36.38 ± 3.88	0.0024
Mean vldl (mg/dl)	42.19 ± 7.85	51.51 ± 10.27	0.0008

Table 5: Comparison of Lipid Profile in different studies

Study	Prevalence of High Total Cholesterol	Prevalence of High TG	Prevalence of High LDL	Prevalence of lower HDL
Al Ghadeer HA et al15	32.3%	33.9%	57.7%	22.1%
Dagnew B et al16	34.1%	48.2%	41.1%	44.4%
Mehta RK et al12	82.1%	73.7%	94.2%	46.9%
Present Study	44.5%	78.2%	44.5%	74.5%

DISCUSSION

The mean duration of diabetes in our study was observed to be 5.84 ± 2.64 years, which is comparable to mean duration of diabetes in study by Kohlar U et al (5.13 ± 4.50 years).[7]

In this study, we observed that 14.5% participants had good glycaemic control (HbA1c<7%) and 85.5% had poor glycaemic control (HbA1c>7%). This is consistent with findings of Kohlar U et al,[7] who observed in their study that 12% patients had well controlled diabetes (HbA1C < 7%) and 88% patients had poorly controlled diabetes (HbA1C >7%).

The mean age of participants with dyslipidemia was 58.10 ± 8.98 years in the present study. This is consistent with study of Ahmmed MS et al,[8] which showed that increased age is positively associated with dyslipidemia. We observed that out of total 96 participants with dyslipidemia, majority of participants (40.6%) belonged to the age group 51-60 years, followed by 31.3% in age group 61-70 years, 18.8% in 41-50 years, 7.2% were above 70 years of age and only remaining 2.1% were between 31 to 40 years of age. Though no evidence has yet been identified that age directly impacts serum lipid profiles but inherited genetic characteristics, insulin resistance and degenerative processes might be associated with age.[9] Another study found that increasing age was associated with dyslipidemia in type-2 diabetic patients because of their workload and poor physical activity.[10,11]

The participants with dyslipidemia in our study comprised of 58.3% males and 41.7% females. The total prevalence rate of dyslipidemia was high in both male (87.5%) and female respondents (86.9%), consistent with the findings of Ahmmed MS et al,[8] and Kohlar U et al.[7] The higher prevalence of dyslipidemia in males was reported by Mehta RK et al.[12] On the contrary, some studies have reported that female diabetic patients were significantly associated with dyslipidemia, which could be ascribed to their working hours and work spheres.[13,14]

In the present study, out of 16 patients with good glycaemic control, 10 patients had normal lipid profile and 6 patients had dyslipidemia. On the other hand, out of 94 patients with poor glycaemic control, only 4 patients had normal lipid profile and 90 patients had dyslipidemia. There was a significant association between prevalence of dyslipidaemia and glycaemic control in our study.[15,16]

The study by Mohan V et al,[17] also showed that TG, TC, LDL, and VLDL are significantly higher in diabetics and HDL was significantly lower in diabetics.

A study by Awadalla H et al,[18] showed no significant differences in TG, TC, LDL, and HDL levels between the glycemic control group and the uncontrolled group. A study by Klisic A et al,[19] reported an association of high HbA1c levels with abnormal TG, TC, LDL, and HDL.

CONCLUSION

This study highlighted the magnitude of dyslipidemia in type 2 diabetic patients. Dyslipidaemia is highly prevalent in diabetics, both males and females and in particular more prevalent in those with poorly controlled diabetes. Common lipid abnormalities in diabetes are raised triglycerides, raised serum LDL,

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raised serum cholesterol and low serum HDL. It is recommended that lipid profile of patients with diabetes should be done at regular intervals. Efforts should be made to increase awareness to public about diabetic dyslipidemia, benefits of change in lifestyle and regular intake of medication and thus, decreasing the prevalence of dyslipidemia among diabetic patients.

Limitations

Further studies with larger sample size are recommended. This study did not measure plasma insulin concentration which would have enabled to find association with insulin resistance. Smoking and alcoholism which may affect lipid parameters were not taken into consideration in this study. Pre-diabetic patients with impaired glucose tolerance may also be included in future studies.

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