Research Article

Comparative study of lipid profile in NIDDM patients who are on oral hypoglycemic agents and insulin

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Abstract

Diabetes mellitus is the commonest metabolic disorder not only of carbohydrate but also of lipids and characterized prematurely by occlative on absolute insufficiency of insulin secretion and concomitant resistance to metabolic action of insulin on largest tissue. The various lipid abnormalities in non-insulin dependent Diabetes mellitus patients is studied and effects of deal hypoglycaemic agents (sulfonyl ureas) and insulin on various lipid foeactions in non-insulin dependent Diabetes mellitus is studied.

Keywords: Non-Insulin Dependent Diabetes mellitus; Oral hypoglycaemic drugs.

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INTRODUCTION

Diabetes mellitus is the commonest metabolic disorder not only of carbohydrate but also of lipids and characterised primarily by relative or absolute insufficiency of insulin secretion and concomitant insensitivity or resistance to metabolic action of insulin on target tissue. Hyperlipedemia and altered lipid metabolism is a relatively common metabolic problem in patients with poorly controlled diabetes mellitus. In the past the presence of abnormal fatty states of circulating blood is to be recognised by the presence of milky appearance. The association of lactescent serum with diabetes was first noted in 1799 by Mainet.

MATERIALS AND METHODS

The present study was carried out in Krishna Rajendra Hospital, Mysore during the period of May 2014 to October 2014. Freshly detected 40 patients with non insulin dependent diabetes mellitus were selected for the study. In doubtful cases diagnosis was confirmed by oral glucose tolerance test (GTT). The study group was in the age of 40-60 years. The study group contained a total of 40 patients of freshly detected NIDDM. The study group was further divided into 2 groups each group containing 20 patients.

OBSERVATIONS AND RESULTS

In this study, 40 patients diagnosed to have NIDDM for the first time were included. Twenty were started on OHAs (sulfonylurea) i.e., OHA treatment group and the remaining 20 were started on Insulin, i.e., Insulin treatment group. The results that were observed particularly in reference to lipid profile area as follows.

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Age and sex distribution

The study was conducted in patients belonging to the age group 40-60 years. Both sexes were included in the study.

Table 1: Age and sex distribution

Age group (years)	Male	Female	Total
40-45	5	7	12 (30%)
46-50	5	4	9 (22.5%)
51-55	5	3	8 (20%)
56-60	5	6	11 (27.5%)
Total	**20**	**20**	**40 (100%)**

Maximum number of patients belonged to the age group 40-45 (30%) followed by age group 56-60 (27.5%). The sex ration was 1:1 i.e., equal number of male and female patients were present in the study (20 each).

Blood Lipids in relation to Age and Sex

The mean lipid levels that were observed before treatment in the different age group are as follows.

Table 2: Blood lipids in relation to age and sex

Age group (years)	Triglycerides		Total cholesterol		HDL cholesterol	
	Male	Female	Male	Female	Male	Female
40-45	209.53±22.76	261.65±82.7	204.09±23	177.70±20.53	43.10±2.80	31.39±6.79
46-50	212.60±33.85	225.00±87.8	195.04±39.15	199.20±50.21	42.49±7.07	37.90±3.16
51-55	284.92±95.55	260.94±35.38	211.80±38	187.45±45.94	38.73±5.22	38.15±4.40
56-60	279.31±82.83	283.59±68.10	205.60±35	174.33±35.36	33.46±5.60	33.25±6.00

In males, the level of HDLc decreased with advancing age; while TG and cholesterol levels did not reveal any definite relationship with age before initiating treatment. In females, no definite correlation of different lipid levels with age was observed.

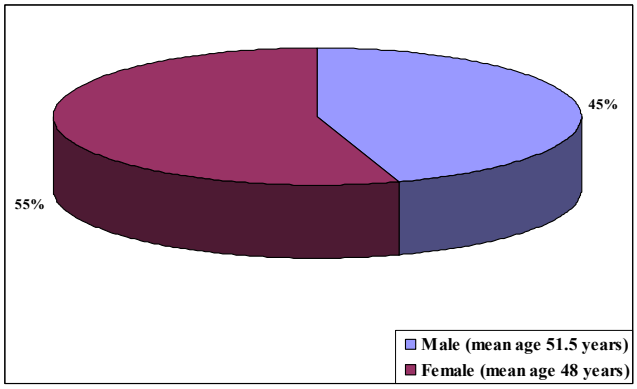

Figure 1: Age and sex distribution in insulin and OHA treated groups insulin group

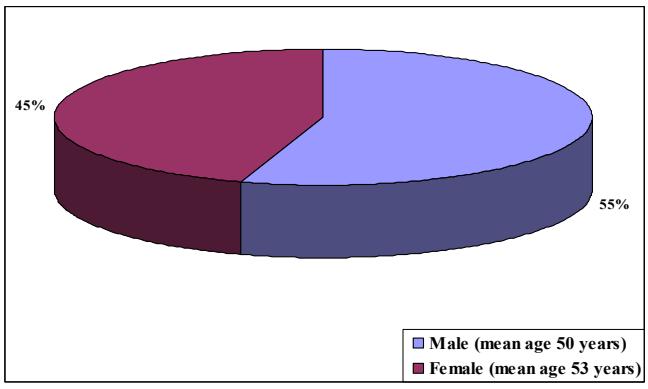

Figure 2: OHA group

Relationship between severity of hyperglycemia and mean lipid levels

The relationship between the level of pre-treatment FBS and the mean level of various lipids was as follows.

Table 3: Relationship between severity of hyperglycemia and mean lipid levels

Fasting blood sugar	Total cholesterol	Triglycerides	VLDL	LDL	HDL
135-200 (No.33) (82.5%)	190.12±32.84	241.10±64.21	48.28±12.87	105.18±31.45	36.77±6.34
201-300 (No.7) (17.5%)	184.44±38.02	320±68.41	63.86±13.76	99.88±46.86	33.54±6.9

The levels of total cholesterol, TG, VLDL and LDL were more in patients who had FBS level > 200 mg% than those who had < 200 mg%. In contrast to this HDL cholesterol was less in those who had FBS> 200 than those with FBS < 200. None of the patients had pre treatment PBS level > 300 mg%. Among those patients (N:29) who showed Glycosylated Hb level of > 10%, the mean TG level was 248.64 mg%.

Types of Hyperlipidemia

The type of hyperlipedemia encountered in the present study was shown in the following table. Hypertriglyceredemia

was the commonest type of hyperlipidemia noticed in the present study. It was noticed in 29 patients and includes 72.5% of total study group. The next common type of hyperlipidemia seen in the study was hypercholestero-triglyceredemia seen in three patients and accounts for 10.3% of total Hyperlipidemia. No cases of isolated hypercholestorolemia were noted in the present study. Apart from this definitive elevation of TG, TC levels nearly ten patients had the triglyceride levels in suspicious range (150-200) and eleven patients had total cholesterol levels in suspicious range (200-250mg).
All the patients in the study group with elevated triglyceride levels (29 patients); had shown turbidity in the overnight refrigerated plasma.

Table 4: Hyperlipidemia among NIDDM patients

	OHA group	Insulin group	Total
Total number of patients studied	20	20	40
Number of patients with hyperlipidemia	14	15	29
Percentage of patient with hyperlipidemia	70%	75%	72.5%

Table 5: Types of hyperlipidemia encountered in the study (both OHA ± Insulin group of patients)

Types of hyperlipidemia	Male	Female	Total
Hypertriglyceridemia (IV)	14	15	29
Hypercholesterotriglyceridemia (IIb)	2	1	3
Hypercholesterolemia	-	-	-

Effects of antidiabetic therapy on lipid levels

The changes in the levels of various lipids in patients treated with OHAs and insulin are shown in table below.

Table 6: Changes in levels of various lipids in patients treated with OHAs and insulin

Levels of lipids	OHA treated group			Insulin treated group		
	Pre-treatment	Post-treatment	Statistical significance	Pre-treatment	Post-treatment	Statistical significance
TC	203.76±26.22	189.27±16.81	p<0.01	179.65±40.93	169.04±33.58	p<0.01
TG	238.80±67.24	191.51±18.31	p<0.001	265.91±82.02	176.16±25.92	p<0.001
LDL	117.10±20.39	107.86±16.97	p<0.001	91.40±40.16	82.65±37.82	p<0.001
VLDL	48.80±11.58	38.14±3.79	NS	54.20±17.60	35.24±5.18	NS
HDL	37.58±3.59	43.28±8.10	NS	35.01±8.45	51.17±7.54	p<0.01

The levels of TC, TG, LDL and VLDL were significantly reduced in both the groups following treatment for three months. Considerable increase in the level of HDL was also observed in both the groups following treatment for three months. The difference noted in TC, TG, HDL levels in the present study after treatment were statistically significant both in insulin and ORA group. The difference in VLDL levels in insulin treated group is statistically significant, but the values are not significant in OHA treated group. The difference noted in LDL levels both in insulin and OHA treated groups were statistically not significant.

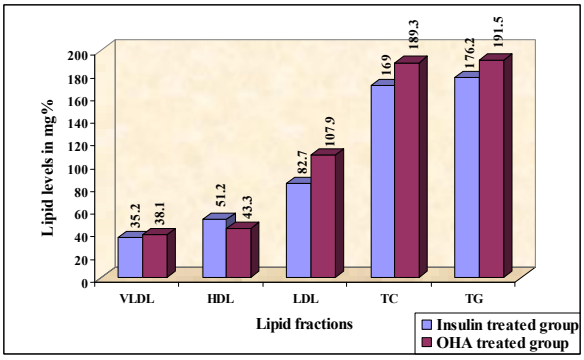

Figure 2: Comparison of lipid levels between insulin and OHA treated patients

DISCUSSION

Age and sex distribution

Several workers in India, like Ajgaonkar and Sathe 1960 Vaishnava 1964, have reported the high incidence of diabetes in males as compared to females. The results of present study are not consistent with the above study. In the present study there were equal number of males and females in each group. This increased incidence of the female patients may be due to increased awareness of diabetes mellitus. The findings of this study in reference to sex incidence of diabetes is almost similar to that of other Indian workers (Rainami *et al* 1966).

Severity of Diabetes and Lipids

In the present study the level of lipids were significantly increased in proportion to the severity of diabetes except for HDLc. The results are consistent with the study of Ahuja and Gossion (1960) who found higher values of TG and cholesterol in patient with FBS greater than 139 mg%. All the patients with glycosylated haemoglobin values of >10% have shown elevated triglycerides. This finding supports the study of Pfeifer *et al* (1983) who found linear relationship between the glycosylated haemoglobin and triglyceride level.

Incidence of Hyperlipidemia in Diabetes

The frequency of hyperlipidemia in uncontrolled diabetes varies in different series. The various studies have shown the incidence of hyperlipidemia ranging from 25% to 75% (Elkes *et al*. 25%, Rodger *et al*. 36%, Lewis *et al*. 40%, Chance *et al*. 75%). In present study hyperlipidemia was found in 29 Patients (72.5%) patients. The hyperlipidemia was noticed more in the females (75%) than in male patients (70%). This finding is in comparison with studies of Okeno *et al*. who found the incidence of hyperlipidemia more in females than in males (62% and 52% respectively).

Types of Hyperlipidemia encountered in the present study

The commonest type of hyperlipidemia encountered in the present study was hypertriglyceridemia (type IV hyperlipoportenemia). It was seen in 29 patients (72.5% of total patients). This study correlated with the study of Heys *et al*. (1973) and Dunn *et al*. (1982). Hypercholestero triglyceredemia as seen in three patients 10.3% of total hyperlipidemia). The hypertriglyceridemia seen in 29 patients (72.5% of total group) was reduced to 5 patients (17.5%) after controlling the diabetes with reducing mean triglycerides values from 287.75±58.7 to 240.08±66.43.

This shows that euglycemic levels are needed for maintenance of normal triglyceride in patients with diabetes (these findings are consistent with that of Bierman *et al*. and Billi Moria.T.D.).

Turbidity of plasma and triglycerides levels

Appearance of overnight refrigerated serum was correlated with triglyceride levels. It was noticed that patients with low triglycerides levels showed clear plasma: whereas high triglycerides levels were associated with turbid plasma. This simple bedside test helps in knowing the increased triglyceride levels.

Response of lipid profile to antidiabetic therapy

OHA (Sulfonylureas) group: In the present study it was observed that in patients treated with OHAs all the lipid abnormalities were reduced except for HDLc, which were increased when compared to that of pretreatment levels. This result correlated with the results of other studies (Dunn FL *et al*. 1988, Ginsberg HN *et al*. 1988, Abott Watt *et al*. 1990) which showed that when OHA (sulfonyl urea) therapy is effective in lowering glucose levels, the accompanying elevated lipid levels (except HDLc) were also significantly reduced. The studies by Retnam *et al*. (1983) have shown that HDLc was reduced with OHA therapy in patients with diabetes. However later studies by Chait *et al*. (1985), Laker *et al*. (1988) and Laakos M Pyorala (1990) have shown that OHA therapy does not lower HDL cholesterol.

Insulin Group: In the present study it is shown that with effective control of hyperglycemia with insulin therapy all lipid fractions lowered from initial levels (pretreatment lipid fraction) except for HDLc which increased significantly. These results correlated with other studies by Taskinen MR (1988); Bagdae J.D. (1990); Taskinin M.R; Packar C.T (1990) who showed that with insulin therapy all lipid fractions were lowered except for LDLc and HDLc. In their study it was shown that with Insulin therapy, the effect of LDLc was variable while HDLc was significantly raised. All the results correlate with the present study but for LDLc, which was lowered. Studies by Crepaldia (1988) have shown that Insulin therapy in patients with diabetes elevates HDLc level significantly. They have shown that there is a direct relationship between lipoprotein lipase activity and HDL levels. The lipoprotein lipase activity is low in NIDDM patients and has shown improvement with Insulin therapy.

Comparison of OHAs and Insulin therapy on Lipid profile in NIDDM patients

In the present study it was noticed that all the lipid fractions were lowered with control of diabetes with OHA and insulin except for HDLc which showed an increasing trend with the treatment. The mean values of TG, TC, VLDL, LDLc Cholesterol were more in OHA (sulfonylurea) treated patients when compared to Insulin treated patients. This report coincides with that of Rethnm *et al*. (1985). In the present study the HDLc levels were significantly increased in Insulin treated patients when compared to that of patients on OHA (sulfonylurea). This is in comparison with the studies of Dunn F.L. *et al*. (1988), Reaven G.M. *et al*. (1987) and Hughes T.A. *et al*. (1987).

CONCLUSIONS

The following conclusion may be drawn from the present study. There is increased incidence of hyperlipidemia in patients with uncontrolled NIDDM. The commonest type of hyperlipidemia in patients with uncontrolled NIDDM is hypertriglyceridemia. Incidence of hyperlipidemia was noticed more in female patients. Control of Hyperglycemia with OHA (sulfonylureas) and Insulin showed improvement of various lipid abnormalities like lowering of TG, TC, VLDLc, LDLc and increase in HDLc values. Mean values of TG, TC, VLDLc, LDLc were more in patients treated with OHA (sulfonylurea) when compared to patients treated with insulin. There was significant rise in HDLc in insulin treated patients.

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