Endocrinology & Diabetes Research

Comparison of Lipid Profile in Diabetic Patients taking Oral Hypoglycemic Drugs Versus Insulin Therapy

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Abstract

Background: Diabetes mellitus is the most prevalent disease all around the world. Medication can be prescribed as insulin and oral anti-glycemic. There is also significant impact of diabetic therapy on lipid profile of diabetic patients.

Objective: To compare lipid profile of diabetic patients taking oral hypoglycemic drugs versus insulin therapy.

Study design: Quasi experimental study.

Materials and Methods: 70 newly diagnosed cases of diabetes, were recruited and divided in 2 groups. Patients who were prescribed insulin were assigned as group A while patient who were prescribed oral anti-glycemic were assigned as group B. The patients were followed for 3 months for serum lipid profile and findings of the lab were noted on proforma. The collected data was analyzed by SPSS-23. Both groups were compared by using student t test at the level of significance ≤ 0.05.

Results: In this study, the mean age of patients was 46.77 years ± 14.80 years in patients taking insulin while 46.89 years ± 14.57 years in oral anti-glycemic group. In patients taking insulin, there were 20 (57.1%) males and 15 (42.9%) females. In oral anti-glycemic group, there were 20 (57.1%) males and 15 (42.9%) females. After 3 months of anti-glycemic course, mean total cholesterol level was 211.74 mg/dl ± 27.59 mg/dl versus 292.97 mg/dl ± 49.72 mg/dl, mean triglycerides level was 216.89 mg/dl ± 50.29 mg/dl versus 262.69 ± 72.33 mg/dl, mean LDL level was 163.34 ± 22.47 mg/dl versus 196.00 ± 24.70 mg/dl and mean HDL level was 48.91 mg/dl ± 9.27 mg/dl versus 46.31 ± 5.14 mg/dl in patients taking insulin therapy versus oral anti-glycemic respectively.

Conclusion: We observed through this trial that the lipid profile of patient taking insulin therapy is more under controlled than patients taking oral anti-glycemic medication.

Introduction

Diabetes mellitus is a multifaceted chronic health disorder caused by a combination of hereditary and/or environmental factors. Indeed, this illness is marked by a high level of familiarity, and diabetes prevalence varies by ethnicity, such as black and Hispanic individuals, and some minorities, such as American Indians and Alaska Natives, are more likely to develop diabetes due to a distinct genetic profile [1]. High blood sugar levels are a symptom of the condition, which is caused by a lack of insulin concentration and/or activity, a pancreatic hormone involved in glycemic control [2].

Pharmacological therapy and/or insulin may be necessary to maintain blood glucose levels as close to normal as feasible and to delay or prevent the onset of diabetes-related health issues [3]. Physical activity and healthy food can also be beneficial in the health management of illness [4]. Individuals with diabetes have a 2 times-4 times higher risk of stroke and death from heart disease than those without diabetes. Dyslipidemia affects 30%-60% of patients of type 2 diabetes, according to estimates [5].

Patients of diabetes usually have higher serum triglyceride levels, higher VLDL and IDL cholesterol levels, and lower HDL cholesterol levels. The rise in VLDL and IDL cholesterol raises non-HDL cholesterol levels. Although LDL cholesterol levels are usually similar to those in healthy people, there is an increase in small dense LDL, a kind of lipoprotein that is thought to be particularly pro-atherogenic. While Low-Density Lipoprotein (LDL) is a well-known risk factor for diabetes, and statins are still the first-line medication for lowering cardiovascular risk, it has become clear that "residual risk" for cardiovascular disease occurs even when LDL-C levels are within target [5].

Previous oral anti-diabetic drugs like biguanides, sulphonulureas, glucosidase inhibitors, and thiazolidinediones, insulin therapy and incretin-based therapies like glucagon like peptide-1 analogoues and dipeptidyl peptidase 4 inhibitors are all used to treat diabetic hyperglycemia pharmacologically. These effects may have cardiovascular risk-lowering advantages in addition to glucose-lowering effects [6,7].

A study done by Habib et al. reported that the mean total cholesterol level with oral hypoglycemic drugs versus insulin was 5.12 mmol/L ± 0.16 mmol/L versus 4.44 mmol/L ± 0.32 mmol/l, triglyceride 1.92 mmol/L ± 0.14 mmol/l versus 1.25 mmol/L ± 0.11 mmol/l, LDL-C 3.30 mmol/L ± 0.15mmol/l versus 2.75 mmol/L ± 0.31mmol/l and HDL-C 0.98 ± 0.05 versus 1.04 mmol/L ± 0.06 mmol/l respectively [8].

The results of this proposed study would help us to educate our diabetic patients regarding optimal control of glucose level and serum lipid profile followed by early diagnosis. This would protect them future adverse cardiovascular events and also improve quality of life, physical activity and productivity. This would not only provide relief to the patients but would also be beneficial national health authorities in terms of availability of more space and less healthcare associated expenditures.

Methodology

Sample size

Sample size is 70 diabetic cases (divided in 2 groups with 35 patients each), calculated using Epi-Info software of CDC using following values; mean value of HDL C in oral hypoglycemic drugs=0.98 mmol/l ± 0.05 mmol/l versus 1.04 mmol/l ± 0.06 mmo/l, power of test=90%, and at confidence level=95%)

Sampling technique

Non-probability, consecutive sampling.

Inclusion criteria

- Age; 20-70 years.
- Gender; both male and female patients.
- Newly diagnosed type II diabetic patients, which was diagnosed as random blood sugar level >200 mg/dl at the time of presentation.

Exclusion criteria

- Known patients with coronary artery diseases, strokes, CRF and CLD (confirmed from medical record).
- Patients with hyperlipidemia associated with hypothyroidism, cushing syndrome and steroids intake.

Data collection procedure

Permission was taken from Institutional Ethical Committee to conduct this study. All the cases of diabetes (70), who fulfilled inclusion criteria were included in the study selected from OPD of Mayo hospital, Lahore. Proper informed consent was taken from each patient to participate in this study; the patients were explained about the objectives of the study and they were also ensured about the confidentiality of the information provided by them and also informed the fact that there was no risk involved to the patient while participating in the study. Once registered, these diabetic patients were divided in 2 groups. Patients who were prescribed insulin were assigned as group A while patients who were prescribed oral anti-glycemic were assigned as group B. The patients were followed for 3 months for final evaluation of serum lipid levels, 3 ml of venous blood sample was drawn under fasting conditions (for more than 8 hours) and were dispatched to the laboratory for serum lipid profile and findings of the lab were noted on proforma by the researcher.

Data analysis

The collected data was entered and analyzed SPSS-23. Descriptive statistics were applied to calculate mean and standard deviation for the age of patients, serum cholesterol, triglycerides, LDL, HDL and disease duration. Frequency (%) were calculated for categorical variables like age groups, control of diabetes, gender, residential status, family history of diabetes and obesity. Both groups were compared using student t test at level of significance ≤ 0.05.

Results

In this study, the mean age of patients was 46.77 years ± 14.80 years in patients taking insulin while 46.89 years ± 14.57 years in oral anti-glycemic group. In patients taking insulin, there were 20 (57.1%) males and 15 (42.9%) females. In oral anti-glycemic group, there were 20 (57.1%) males and 15 (42.9%) females. The mean BMI of patients at enrollment was 25.30 kg/m^2 ± 3.07 kg/m^2 in patients taking insulin while 34.12 kg/m^2 ± 4.33 kg/m^2 in oral anti-glycemic group. In patients taking insulin, out of 35 patients, 21 (60.0%) came from rural area while 14 (40.0%) came from urban areas. In oral anti-glycemic group, out of 35 patients, 13 (37.1%) came from rural area while 22 (62.9%) came from urban areas. In patients taking insulin, family history was positive for diabetes in 15 (42.9%) cases. In oral anti-glycemic group, family history was positive for diabetes in 21 (60%) cases. In patients taking insulin, 19 (54.3%) patients had good or controlled glycemic level while 16 (45.7%) had uncontrolled diabetes. In oral anti-glycemic group, 14 (40.0%) patients had good or controlled glycemic level while 21 (60.0%) had uncontrolled diabetes (Table 1).

	Group	
	Insulin	**Oral**
n	35	35
Age (years)	46.77 ± 14.80	46.89 ± 14.57
Gender		
Male	20 (57.1%)	20 (57.1%)
Female	15 (42.9%)	15 (42.9%)
BMI	25.30 ± 3.07	34.12 ± 4.33
Residence		
Rural	21 (60.0%)	13 (37.1%)
Urban	14 (40.0%)	22 (62.9%)
Family history of diabetes		
Positive	15 (42.9%)	21 (60%)

Negative	20 (57.1%)	14 (40%)
Control of diabetes		
Controlled	19 (54.3%)	14 (40.0%)
Uncontrolled	16 (45.7%)	21 (60.0%)

Table 1: Baseline characteristics of patients (n=70).

After 3 months of anti-glycemic course, in patients taking insulin therapy, mean total cholesterol level was 211.74 mg/dl ± 27.59 mg/dl while in oral anti-glycemic group, mean total cholesterol level was 292.97 mg/dl ± 49.72 mg/dl. The difference in both groups was significant (p<0.05). In patients taking insulin therapy, mean triglycerides level was 216.89 mg/dl ± 50.29 mg/dl while in oral anti-glycemic group, mean triglycerides level was 262.69 mg/dl ± 72.33 mg/dl. The difference in both groups was significant (p<0.05). In patients taking insulin therapy, mean LDL level was 163.34 mg/dl ± 22.47 mg/dl while in oral anti-glycemic group, mean LDL level was 196.00 mg/dl ± 24.70 mg/dl. The difference in both groups was significant (p<0.05). In patients taking insulin therapy, mean HDL level was 48.91 mg/dl ± 9.27 mg/dl while in oral anti-glycemic group, mean HDL level was 46.31 mg/dl ± 5.14 mg/dl. The difference in both groups was insignificant (p>0.05) (Table 2).

	Group		P-value
	Insulin	**Oral**	
n	35	35	
Total cholesterol	211.74 ± 27.59	292.97 ± 49.72	0
Triglycerides	216.89 ± 50.29	262.69 ± 72.33	0.003
LDL	163.34 ± 22.47	196.00 ± 24.70	0
HDL	48.91 ± 9.27	46.31 ± 5.14	0.151

Table 2: Comparison of lipid profile in both groups (n=70).

Discussion

Diabetes mellitus is a collection of metabolic illnesses marked by hyperglycemia as a result of abnormalities in insulin secretion, insulin action, or both. If the body cell does not absorb the glucose, it will build up in the blood, resulting in "hyperglycemia." Chronic hyperglycemia can lead to a variety of complications. The American diabetes association and the world health organization have proposed a new classification for diabetes [9,10]. Despite the availability of numerous classes of antidiabetic medicines with extremely low hypoglycemia risks, many diabetic patients are often treated with insulin early in the disease process. Furthermore, most diabetic patients will eventually require insulin to successfully regulate glucose levels and prevent diabetes-related problems as their diabetes progresses and their-cells deteriorate. Reduced triglycerides and increased HDL-C are two direct insulin-related beneficial impacts on the lipid profile; LDL-C levels are usually unchanged [11-13]. Diabetic patients, who are treated with insulin, have a better lipid profile than those who are treated with oral hypoglycemic medications [14].

In this trial, we recruited 70 newly diagnosed patients and prescribed them insulin and oral anti-glycemic for 3 months. At end of trial, mean total cholesterol level was 211.74 mg/dl ± 27.59 mg/dl versus 292.97 ± 49.72 mg/dl, mean triglycerides level was 216.89 ± 50.29 mg/dl versus 262.69 ± 72.33 mg/dl, mean LDL level was 163.34 mg/dl ± 22.47 mg/dl versus 196.00 mg/dl ± 24.70 mg/dl and mean HDL level was 48.91 mg/dl ± 9.27 mg/dl versus 46.31 mg/dl ± 5.14 mg/dl in patients taking insulin therapy versus oral anti-glycemic respectively. The difference in both groups was significant and patients taking insulin showed better control of lipid profile than patients taking oral anti-glycemic medication.

Another similar trial showed that after treatment, mean total cholesterol level was 4.44 mmol/L ± 0.32 mmol/L with insulin while 5.12 mmol/L ± 0.16 mmol/L with oral anti-glycemic (p<0.001). The, mean triglycerides level was 1.25 mmol/L ± 0.11 mmol/L versus 1.92 mmol/L ± 0.14 mmol/L, mean LDL level was 2.75 mmol/L ± 0.31 mmol/l versus 3.30 mmol/L ± 0.15 mmol/l and mean HDL level was 1.04 mmol/L ± 0.06 mmol/l versus 0.98 ± 0.05 mmol/l in patients taking insulin therapy versus oral anti-glycemic respectively.

The difference was observed to be significant and patients taking insulin showed better control of lipid profile than patients taking oral anti-glycemic medication [8]. The number of low-density lipoprotein receptors increases as insulin levels rise; as a result, LDL receptor numbers fall as insulin levels fall, resulting in greater LDL cholesterol levels in patients with type 2 diabetes. Dyslipidemia increases the advancement of atherosclerosis, making it a modifiable risk factor for cardiovascular diseases in diabetic patients [15].

Conclusion

We observed through this trial that the lipid profile of patient taking insulin therapy is more under controlled than patients taking oral anti-glycemic medication. So in future, in treatment naïve diabetic patients, we can recommend use of insulin for glycemic control than oral and it can be considered as more appropriate choice of diabetes as well as good control on lipid profile as well.

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