A STUDY OF DYSLIPAEDIMIA IN TYPE 2 DIABETES MELLITUS AND ITS CORRELATION WITH GLYCATED HEMOGLOBIN

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ABSTRACT

BACKGROUND

Glycosylated haemoglobin (HbA1c) is a parameter of glucose homeostasis and a marker for long – term glycaemic control. The aim of the study is to understand the pattern of dyslipidaemia among the Type 2 diabetic patients and to understand its association with Glycated haemoglobin (HBA1C).

MATERIALS AND METHODS

The study was conducted in 100 cases diagnosed with Type 2 diabetes mellitus.

RESULTS

This study showed that HbA1c demonstrate the positive and significant correlation with total cholesterol, triglycerides, LDLc, (P value 0.02) and a negative correlation with HDLc.

CONCLUSION

HBA1C target, if achieved by tight glycaemic control can reduce complications in Type 2 diabetic patients.

KEYWORDS

Dyslipidaemia, Type 2 diabetes mellitus, Glycated haemoglobin.

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BACKGROUND

Diabetes mellitus (DM) is a hereditary, chronic and endocrine-metabolic disorder.[1] DM is a group of metabolic disease characterized by hyperglycaemia resulting from defects in insulin secretion, insulin action or both.[2] It is characterized by metabolic abnormalities and long-term micro and macro vascular complications.

Glycosylated haemoglobin (HbA1c) is a parameter of glucose homeostasis in comparison to fasting glycaemia, thus giving a prognostic information in patients of diabetes. Glycated haemoglobin (HbA1c) is a marker for long – term glycaemic control. The amount of glycated haemoglobin (HbA1c) reflects the glycaemic control of a patient during the 6-8 week period.

At present HbA1c is the best marker for setting goals of treatment.[4] The Diabetes complications and control trial (DCCT) established HbA1c as the gold standard of glycaemic control. The HbA1c value 7.0% is appropriate for reduction of the cardiovascular complications.[5]

Changes in lipid and lipoprotein profile contribute to atherosclerosis in type 2 diabetes.[6] Diabetic dyslipidaemia is generally characterized by increased plasma triglyceride (TG) and decreased high-density Lipoprotein cholesterol (HDL-C) concentrations, a small low-density lipoprotein (LDL), and an increased Apo lipoprotein B concentration. Although the major focus on the connection between lipids and CHD is on LDL-cholesterol (LDL-C), the Adult Treatment Panel III has recognized the important roles of HDL-C & TGs, calling this combination an atherogenic dyslipidaemia.[7] Dyslipidaemia is elevation of plasma cholesterol, triglycerides (TGs), or both, or a low high-density lipoprotein–Cholesterol (HDL-C) level that contributes to the development of atherosclerosis, which may be primary (genetic) or secondary and diagnosed by measuring plasma levels of total cholesterol (TC), TGs, and individual lipoproteins.[4] Dyslipidaemia is a well-recognized and modifiable risk factor that should be identified early to institute aggressive cardiovascular preventive management.[8] Patients with type 2 DM are at greater risk of developing vascular diseases because of lipid changes. Lipid abnormalities and insulin use is critically discussed in

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diabetics.[9] Diabetic dyslipidaemia and atherogenic dyslipidaemia typically seen in diabetes consists of moderate elevation in TG levels, low HDL-C cholesterol values, and low density lipoproteins cholesterol (LDL-C) (especially small dense LDL particles.[10]

The aim of the study is to understand the pattern of dyslipidaemia among the Type 2 diabetic patients and to understand its association with Glycated haemoglobin (HBA1C).[11] Early detection and intervention in diabetes is considered as most important public health issue. Tight control of blood sugar remains the main target in reducing the incidence of diabetic complications. For prevention of diabetic complications a good and tight glycaemic control is needed.

MATERIALS AND METHODS

The study is cross sectional study and was conducted in Department of Medicine Jhalawar medical college, Jhalawar (Rajasthan) from October 2017 to march 2018 with prior approval of ethical committee.

100 cases diagnosed with type 2 diabetes mellitus with in age group of 30-75 years were included in the study. Out of which 50 diabetic patients were with good glycaemic control Group A and 50 diabetic patients were with poor glycaemic control Group B.

Venous blood was collected from the subjects after an overnight or 12 hours of fasting. Samples were analysed for fasting plasma glucose, lipid profile and glycated haemoglobin. Diabetes was diagnosed as per American Diabetes Association (ADA) criteria.[12] For serum lipid reference level, National Cholesterol Education Programme (NCEP) Adult Treatment Panel III (ATP III) guideline was referred.[13] High low-density lipoprotein (LDL) >190 mg/dl, high cholesterol >200 mg/dl, and high TG >200 mg/dl.

Patients are enquired for present illness. History of type 2 diabetes mellitus is noted for duration of disease, diet, medication, exercise. Personal history regarding dietary habits, sleep, appetite, substance abuse, bladder, and bowel habits were taken. Any signs of atherosclerosis were looked for. Thorough systemic examination was carried out. These findings were recorded in proforma designed for the study.

Inclusion Criteria

All diagnosed cases of Type 2 diabetes mellitus.

Exclusion Criteria

The patients with type 1 Diabetes Mellitus, Patients on lipid lowering agents, Chronic kidney disease stage 3 and above, retinopathy, recent major surgery, nephropathy, infection, diabetic foot were excluded.

RESULTS

Out of 100patients, 60 were male and 40 were female. In male patients, 52% were in age group of 41-50 years, 34% were in age group of 51-60 years and 14% were above 60 years of age. In female patients, 35% were in age group of 41-50 years, 45% were in age group of 51-60 years and 20% were above 60 years of age. (Table 1)

Age Group (Years)	Male	Female	Total
30-40	0	0	0
41-50	31	14	45
51-60	20	18	38
>60	9	8	17
Total	60	40	100

Table 1. Age and Sex Distribution of Study Subjects

The patients were classified into two groups depending on their glycated haemoglobin (HbA1c); group A having HbA1c > 7.0% (n= 50) and group B having HbA1c <7.0% (n= 50).

This study showed result that HbA1c demonstrate the positive and significant correlation with total cholesterol, triglycerides, LDLc, (P value 0 .02) and a negative correlation with HDLc.

Parameter	Group A (N=50)	Group B (N=50)
TG	174.54	110.33
TC	192.87	160.54
HDL	35.43	42.23
LDL	121.53	95.38

Table 2. Comparison between 2 Groups of Cases

DISCUSSION

Acute and long term complications occur in Diabetes mellitus and these can be reduced by proper medical care and health education. Assessment of blood glucose level control can be done by measuring glycated haemoglobin (HBA1c), fasting blood sugar (FBS), and Lipid profile. Follow up is done by assessment of glycaemic control. The gold standard method is the glycated haemoglobin level.[14] High concentrations of glucose can increase in glycation of common proteins such as HbA1c, formed through the non-enzymatic attachment of glucose to haemoglobin which occur due to high glucose level in previous 8–12 weeks, the time period being dictated by the 120-day lifespan of the erythrocyte.[15] Insulin regulates the activity of lipoprotein lipase and cholesterol ester transfer protein and it affects production of Liver Apo-lipoprotein. Dyslipidaemia in diabetes mellitus[16] is caused by all these factors.

A total number of 100 patients were studied. Abnormality of cholesterol metabolism may lead to cardiovascular disease and heart attacks. This study shows a high prevalence of hypercholesterolemia, hypertriglyceridemia, high LDL, and low HDL levels which are well-known risk factors for cardiovascular disease and incidence of poor glycaemic control in Type 2 diabetic patients.

Our study showed a significant correlation between HbA1c and Non-HDLc. Non-HDLc was shown to be the stronger predictor of CVD in diabetic population [5] as seen in other studies.

Limitations of Study

Sample size is of this study is small (for group A, n=50 and for group B n=50). Large sample size is needed to

demonstrate a better result. All the patients had a long duration of diabetes (more than 5 years), so time bias was present.

CONCLUSION

There is a correlation between lipid profile and HBA1C in type 2 DM patients. Our findings are almost same as seen in other studies.

HBA1C target, if achieved by tight glycaemic control can reduce complications in Type 2 diabetic patients.

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