

A study of HbA_{1c} and dyslipidemia in diabetes mellitus

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Abstract

Background: HbA_{1c} is commonly used as a marker of long term glycemic status. Elevated HbA_{1c} has also been regarded as an independent risk factor for CAD in subjects with or without diabetes. **Aims and Objectives:** To study HbA_{1c} and dyslipidemia in Diabetes Mellitus. **Methodology:** This was a cross-sectional study carried out in the diabetic patients at tertiary health care center during six-month period i.e. January 2017 to July 2017 in the randomly selected 100 known diabetic patients, the diagnosis was confirmed by Oral Glucose tolerance test, in all the patients which selected for study undergone Glycosylated HbA_{1c}, lipid profile. The statistical analysis done by Chi-square test, calculated by SPSS 19 version software. **Result:** The majority of the patients were in the age group >60 i.e. 32%, 50-60 i.e. 27% followed by 40-50-26%, 30-40 i.e. 10%, 20-30 were 5%. The majority of the patients were Male i.e. 69% followed by Female i.e. 31%. Only 7.32 % were dyslipidemic in Normal (6.0%) range, 19.44% in Prediabetic (6.0%-6.4%) range and in the Diabetic (>6.4) range were dyslipidemic, so the majority of the dyslipidemic persons were having HbA_{1c} level in the Diabetic (>6.4) range. **Conclusion:** It can be concluded from our study dyslipidemia was significantly prevalent in the patients who were having higher HbA_{1c} level.

Key Words: HbA_{1c} (Glycosylated Hemoglobin), Dyslipidemia, Lipid Profile.

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INTRODUCTION

HbA_{1c} is commonly used as a marker of long term glycemic status. Elevated HbA_{1c} has also been regarded as an independent risk factor for CAD in subjects with or without diabetes. Thus elevated HbA_{1c} has been proposed as an independent risk factor for both diabetics and CAD patients¹. Significantly increased levels of cholesterol and lipids are seen in type 2 diabetic patients with CAD as compared to diabetic patients without CAD². It has been observed that there is a direct correlation between HbA_{1c} and the severity of CAD in diabetic patients³. The

American Diabetes Association (ADA) estimated that the risk of diabetes related mortality increased 25% for each 1% increase in HbA_{1c}. It has also been estimated that each percentage point increase in HbA_{1c} corresponds to a 35% increase in the risk of macrovascular complication and an 18% increase in risk of myocardial infarction⁴. A strong correlation has been shown between lipid profile and CAD. The Framingham study has demonstrated a linear increase in CAD risk with increment of TC level from 180 mg upward. The study established that individuals with HDL cholesterol less than 35 mg/dl have 8 times increase in CAD incidence than those with HDL cholesterol more than 65 mg/dl⁵. The Lipid Research clinics Coronary Primary Prevention Trial concluded that a 1% fall in the TC reduced the CAD risk by 2%⁶. Helsinki heart study concluded that a mean 12% rise in HDL cholesterol and an 11% fall in LDL cholesterol were both correlated with a 34% decline in CAD⁷. Very few studies have shown a positive correlation between glycemic control and lipid profile. Dyslipidemia, frequently occurring in type 2 diabetes patients, might play a critical role in accelerated macrovascular atherosclerotic disease formation and may contribute

significantly to the excess risk of CAD in type 2 diabetes patients⁸. Early therapeutic interventions, aiming to stabilize blood glucose levels along with reduction in TG and LDL and to increase HDL, significantly reduce cardiovascular events and mortality in patients with type 2 diabetes⁹.

MATERIAL AND METHODS

This was a cross-sectional study carried out in the diabetic patients at tertiary health care center during six-month period i.e. January 2017 to July 2017 in the randomly selected 100 known diabetic patients, the diagnosis was confirmed by Oral Glucose tolerance test, in all the patients selected for study undergone Glycosylated HbA_{1c}, lipid profile. All details of the patients like age, sex etc. noted. The lipid profile of the study was analyzed as per the standard definition of dyslipidemia- Low HDL 190 mg/dl, high cholesterol >200 mg/dl, and high TG >200 mg/dl. The statistical analysis done by Chi-square test, calculated by SPSS 19 version software.

RESULT

Table 1: Distribution of the patients as per the age

Age	No.	Percentage (%)
20-30	5	5
30-40	10	10
40-50	26	26
50-60	27	27
>60	32	32

The majority of the patients were in the age group >60 i.e.32%, 50-60 i.e. 27% followed by 40-50-26%, 30-40 i.e. 10%, 20-30 were 5%.

Table 2: Distribution of the patients as per the sex

Sex	No.	Percentage (%)
Male	69	69
Female	31	31
Total	100	100

The majority of the patients were Male i.e. 69% followed by Female i.e. 31%

Table 3: Correlation of Dyslipidemia with HbA_{1c} level

HbA _{1c}	Dyslipidemia Present	Absent	Total
Normal (6.0%)	3 (7.32)	38 (92.68)	41 (100%)
Prediabetic (6.0%-6.4%)	7 (19.44)	29 (80.56)	36 (100%)
Diabetic (>6.4)	15 (65.22)	8 (34.78)	23 (100%)
Total	25 (25%)	75 (75%)	100 (100%)

($\chi^2 = 27.27, df=2, p<0.0001$)

Only 7.32 % were dyslipidemic in Normal (6.0%) range, 19.44% in Prediabetic (6.0%-6.4%) range and in the Diabetic (>6.4) range were dyslipidemic, so the majority

of the dyslipidemic persons were having HbA_{1c} level in the Diabetic (>6.4) range.

DISCUSSION

It is estimated that currently India has 62.4 million people with diabetes mellitus. This is a major public health challenge, and it is increasing in epidemic proportions. Chronic hyperglycemia leads to micro- and macro-vascular complications. The lipid abnormalities in diabetics such as increased cholesterol, increased LDH, high triglycerides (TG), and low high-density lipoprotein (HDL) are contributing to the mortality and morbidity. Worsening of glycemic control deteriorates lipid and lipoprotein abnormalities and particularly of diabetes mellitus. The combination of hyperglycemia, dyslipidemia, and hypertension produces enhanced atherogenic environment within the circulation. This leads to increased risk of ischemic heart disease, stroke, and myocardial infarction. Diabetes mellitus is considered as coronary heart disease equivalent. Insulin resistance, relative insulin deficiency, and obesity are associated with deranged lipid profile. The American Diabetes study has come to a conclusion that HbA_{1c} equivalent. Insulin resistance, relative insulin deficiency, and obesity are associated with deranged lipid profile. The American Diabetes study has come to a conclusion that HbA_{1c}<7 mg/dl signifies optimal blood glucose levels. The management should focus on controlling diabetes and managing lipid levels which will reduce mortality and morbidity for ischemic heart disease and other diabetic complications.^{10,11-18} In our study we have seen that the majority of the patients were in the age group >60 i.e.32%, 50-60 i.e. 27% followed by 40-50-26%, 30-40 i.e. 10%, 20-30 were 5%. The majority of the patients were Male i.e. 69% followed by Female i.e. 31%. Only 7.32 % were dyslipidemic in Normal (6.0%) range, 19.44% in Prediabetic (6.0%-6.4%) range and in the Diabetic (>6.4) range were dyslipidemic, so the majority of the dyslipidemic persons were having HbA_{1c} level in the Diabetic (>6.4) range. These findings are similar to Prabhavathi K.¹⁹ they found HbA_{1c} showed direct and significant correlations with cholesterol, TG and LDL. Univariate analysis showed that HbA_{1c} was a good predictor of circulating lipid levels.

CONCLUSION

It can be concluded from our study dyslipidemia was significantly prevalent in the patients who were having higher HbA_{1c} level .

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