Research Article

Hba1c as Marker of Dyslipedemia in Type 2 Diabetes Mellitus Patients

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Abstract: Diabetes mellitus is a major non communicable disease affecting both developed and developing nations .It is a major risk factor for coronary heart disease and other micro vascular diseases in diabetic patients .In India it is increasing in epidemic proportions .HBA1C level is gold standard in knowing control of diabetes mellitus and its complications. The lipid abnormalities in uncontrolled diabetes mellitus contribute to cardiovascular and peripheral vascular complication morbidity and mortality. We studied 185 diabetic patients attending medical outpatient department between January 2013 and August 2013. Our aim was to know the relation between HBA1C and lipid abnormality in diabetic patients. Our results showed there is a linear correlation between hba1c level and lipid abnormalities. The p value was significant with HBA1C, Total Cholesterol and LDL level. To reduce the burden **of** morbidity and mortality from micro vascular complications, it necessary to control diabetes and lipid levels in diabetic patients. Measurement of hba1c level and keeping it within normal limits is warranted.

Keywords: Diabetes Mellitus, Dyslipedemia, LDL, HDL, TG, Hba1c

INTRODUCTION

Diabetes mellitus is a group of metabolic disorder that share the phenotype of hyperglycemia .There are distinct type of diabetes mellitus. The commonest one is adult onset type 2 diabetes mellitus [1]. The disease is rapidly increasing globally especially in developing countries like India. Many epidemiological studies have demonstrated that diabetes is well known risk factor for developing cardiovascular, cerebrovacular disease in general population [2]. The main contributory factors for these complications are uncontrolled diabetes mellitus and dyslipedemia .The dyslipedemia seen in diabetes mellitus patients are characterized by increased triglycerides level, high low density lipoproteins, and low high density lipoproteins. In India it estimated that 2 % of population have diabetes mellitus [3].This is going to increase by 5 -6 % every year and it is estimated that 300,000 people die of diabetes and its complication every year [4]. World Health Organization has declared India as diabetic capital of world because of alarming increase in incidence and prevalence of diabetes mellitus. So early control of diabetes mellitus and lipid abnormality will reduce the morbidity and mortality in diabetic patients [5, 6]. Diabetes Complications and Control Trial established that strict control of diabetes reduces micro vascular complications and glycated hemoglobin as gold standard investigation of diabetes control [7].

This study was undertaken to know the relation between Hba1c level and dyslipedemia in Diabetic patients.

MATERIALS AND METHODS

This is a cross-sectional study conducted in department of medicine in DM Wayanad Institute of Medical Sciences Meppadi Kerala. Adult Type 2 diabetes patients attending medical OPD during January 2013 to August 2013 were included in this study. Ethical clearance was taken from College Ethical Committee.

Fasting venous blood samples from all patients were analyzed for total cholesterol (TC), low density lipoproteins (LDL), high density lipoproteins (HDL) and triglycerides (TG). Other investigations included were HBA1c, fasting blood sugar, urea and creatinine.All patients underwent detailed clinical examination and BMI was estimated according standard formula. Fasting blood sugar, lipid profile, urea, serum creatinine and urea were estimated using Cobas Integra 400 plus, Roche USA analyzer (photo calorimetric method).Hba1c was measured using Nyco Card Reader 2 of Axis shield Norway (calorimetric method).

Patients on lipid lowering drugs and endocrinopathies like Cushing syndrome, Thyroid disorders were not included in the study. Patients with any diabetic complications were also excluded from study.ADA (American diabetic Association) criteria were used in defining diabetes mellitus [8]**.** ATP3 NCEP guidelines were used in defining dyslipedemia [9].

Dyslipedemia is defined, if any of these abnormalities are present

- Total cholesterol >200 mg
- Low density lipoprotein (LDL) >100 mg

- High density lipoprotein (HDL) <40 mg
- Triglycerides (TG) >160 mg
- Hba1c level of <7% is taken as normal, anything above is abnormal.

We included 185 diabetic patients in the present study .The patients comprised more of rural area as the medical college is situated in rural area. Data analysis was done using SPSS 17 software.

RESULTS

We included 185 diabetic patients in this study. Among these 100 were male and 85 were female patients. Mean age of the patients was 53.25±8. Characteristics of BMI, lipids and HBA1C are given in Table 1. Abnormal HBA1C noted in 83.8%, Total Cholesterol in 54.6%,LDL in 81.6%, HDL in 37.3%,and Triglycerides in 54.4% of patients.

Abnormalities of HBA1C and Lipid Abnormalities were similar in both male and female patients except HDL abnormality which was more prevalent in male patients (Table 2).

The correlation between HBA1C level and lipid abnormality was done using Pearson's correlation. There was significant correlation between LDL and Total cholesterol abnormality, where p value was significant (Table 3).

DISCUSSION

Presence of diabetes mellitus is designated as coronary heart disease equivalent compared to non diabetic patients [10].The main risk factors are uncontrolled diabetes mellitus and dyslipedemia which contribute to increased cardiovascular risk in diabetic patients.

The main lipid abnormalities noted in diabetes mellitus are high LDL, low HDL, increased Total Cholesterol, high Triglycerides and postprandial lipemia [11].

Several factors are responsible for diabetes dyslipedemia, important are insulin effect on liver apoprotein production, regulation of lipoprotein lipase (lpl), activation of cholestryl Ester Transfer Protein (CETP) and peripheral vascular action of insulin on adipose and muscle tissue.

To reduce the risk of morbidity and mortality in type 2 diabetes mellitus we need to focus on control of diabetes mellitus and dyslipedemia.The DCCT trail has clearly shown that the reduction of HBA1C to less than 7 % will reduce microvascular complications [12].

In our study 83% of male and 87 %of females had uncontrolled diabetes mellitus. Lipid abnormalities were present in most of the patients .This suggest high prevalence of dyslipedemia in uncontrolled diabetes mellitus patients . These findings are similar to earlier studies.

A significant correlation noted between HBA1C and LDL, Total Cholesterol in our study is similar to earlier reports [13]. A significant correlation between HBA1C level and lipid abnormalities were also noted and suggested importance of control of diabetes and control of lipids in Chinese study [14]. HBA1C abnormality indicates uncontrolled diabetes mellitus and dyslipedemia in diabetic patients and increases risk for micro vascular complications .To prevent these it is important to focus on HBA1C control and targeting lipids to avoid morbidity and mortality in diabetic patients .HBA1C measurement helps to control dm and helps identify dyslipedemis.

Table 1: Showing characteristics of patients

Descriptive Statistics of patients					
Characteristics	N	Minimum	Maximum	Mean	Std. Deviation
Age	185	28	69	53.25	8.522
BMI	185	17.64	34.17	24.8792	2.88207
Duration	185	1	20	6.34	4.953
HBA1C	185	5.0	16.0	9.002	2.0021
Total Cholesterol	185	103	469	210.29	52.007
LDL	185	47	385	135.46	44.707
HDL	185	16	78	43.83	10.136
Triglycerides	185	68	547	173.20	81.154
Valid N (list wise)	185				

Table 2: Showing abnormalities in male and female patients

Abnormal	Male	Female
HBA1C	83%	84.7%
Cholesterol	52%	57.6%
LDL	75%	89.4%
HDL	50%	22.4%
Tryglycerides	58%	43.5%

Table 3: Showing correlation between different parameters

	Correlations				
		HBA1C	Total Cholesterol	LDL	HDL	Triglycerides
HBA1C	Pearson Correlation	1	0.260**	0.233**	-.003	0.125
	Sig. (2-tailed)		0.000	0.001	0.968	0.089
	N	185	185	185	185	185
Total Cholesterol	Pearson Correlation	0.260**	1	0.862**	0.128	0.368**
	Sig. (2-tailed)	0.000		0.000	0.083	0.000
	N	185	185	185	185	185
LDL	Pearson Correlation	0.233**	0.862**	1	0.091	0.099
	Sig. (2-tailed)	O.001	0.000		0.217	0.179
	N	185	185	185	185	185
HDL	Pearson Correlation	-.003	0.128	0.091	1	-.356**
	Sig. (2-tailed)	0.968	0.083	0.217		0.000
	N	185	185	185	185	185
Triglycerides	Pearson Correlation	0.125	0.368**	0.099	-.356**	1
	Sig. (2-tailed)	0.089	0.000	0.179	0.000	
	N	185	185	185	185	185
**. Correlation is significant at the 0.01 level (2-tailed)						

REFERENCES
1. Fauci AS, Braunwald E, Kasper DL, Hauser SL, LongoDL, Jameson JL; Harrisons Principle of Internal Medicine. 17th edition, McGraw-Hill Medical, 2008.
2. Bener A, Zirie M; Lipids, lipoprotein (a) profile and HbA1c among Arabian Type 2 diabetic patients : Biomedical Research, 2007; 18 (2): 97-102.
3. Swami Shankardevanand; Yogic Management of Asthma and Diabetes. Yoga Publications Trust, Munger, Bihar, India, 2002.
4. Khan HA, Sobki SH, Khan SA; Association between glycaemic control and serum lipids profile in type 2 diabetic patients: HbA1c predicts dyslipidaemia. Clin Exp Med., 2007; 7(1): 24-29.
5. Haffner SM, Lehto S, Ronnemaa T, Pyorala K, Laakso M; Mortality from coronary heart disease in subjects with type 2 diabetes and in nondiabetic subjects with and without prior myocardial infarction. N Engl J Med., 1998; 339: 229-234.
6. Windler E; What is the consequence of an abnormal lipid profile in patients with type 2 diabetes or the metabolic syndrome? Atheroscler Suppl., 2005; 6(3): 11-14.
7. Gotto AM Jr; Cardiologist's role in improving glucose control and global cardiovascular risk in patients with type 2 diabetes mellitus. Am J Cardiol., 2007; 99 (4A): 3B–5B.
8. American diabetes Association; The expert committee on the diagnosis and classification of diabetes mellitus. Diabetes Care, 2005; 28(1): s4- s36.

9. U.S. Department of Health And Human Services NIH Publication No. 01-3305, Public Health Service, National Institutes of Health, National Heart, Lung and Blood Institute, 2001. Available from http://www.manyfacescon ference.org/conference2010/2b-framingham-handout.pdf

10. Juutilainen A, Lehto S, Ronnemaa T, Pyorala K, Laakso M; Type 2 Diabetes as a Coronary Heart Disease Equivalent: An 18-year prospective population-based study in Finnish subjects. Diabetes Care, 2005; 28(12): 2901–2907.

11. Goldberg IJ;l Diabetic Dyslipidemia: Causes and Consequences. The Journal of Clinical Endocrinology & Metabolism, 2001:86(3): 965 -971.

12. Diabetes Control and Complications Trial (DCCT): Results of Feasibility Study. The DCCT Research Group.
Diabetes Care, 1987; 10(1):1 -19.

13. Rosediani M, Azidah AK, Mafauzy M; Correlation between fasting plasma glucose, post prandial glucose and glycated haemoglobin and fructosamine. Med J Malaysia, 2006; 61(1): 67-71.

14. Ko GT, Chan JC, Woo J, Lau E, Yeung VT, Chow CC *et al.*; Glycated hemoglobin and cardiovascular risk fac-tors in Chinese subjects with normal glucose tolerance. Diabet Med., 1998; 15(7): 573-578.