



LIPID PROFILE AND GLYCATED HAEMOGLOBIN IN TYPE 2 DIABETIC PATIENTS

Biochemistry

Padmavathi parthasarathy*

Tutor, Department of Biochemistry, A.C.S Medical College & Hospital, Chennai, India.
*Corresponding Author

Dr.Brindha

Professor & head, Department of Biochemistry, A.C.S Medical College & Hospital, Chennai, India.

Dr. Sathiya priya

Assistant professor, Department of Biochemistry, A.C.S Medical College & Hospital, Chennai, India.

ABSTRACT

Uncontrolled hyperglycaemia results to impaired lipid metabolism which leads to cardiovascular disease. Glycated haemoglobin (HbA1c) used as a marker for long-term glycemic control. Aim of this study is to evaluate the relationship between HbA1c and lipid profile in type 2 diabetics, also to determine the ability of HbA1c as an indirect indicator of dyslipidaemia.

METHODS: Cross sectional study conducted on confirmed type 2 diabetes mellitus (n=55). From Jan to April 2016. We measured HbA1c, Fasting Blood Sugar, and Lipid profile.

RESULTS: The HbA1c showed significant difference between males (7.68±1.37) and females (7.23±0.80). In male HbA1c showed positive correlation with FBS, and negative correlation with HDL. Whereas in female HbA1c showed positive correlation with FBS, TG and VLDL which are statistically significant

CONCLUSION: Glycemic control has impact on the lipid profile levels. Our study also added value of HbA1c as an indirect indicator of dyslipidaemia in type 2 diabetics.

KEYWORDS

Type 2 diabetics, HbA1c, Lipid profile

INTRODUCTION:

Diabetes mellitus (DM) a non-communicable metabolic disease with increased blood glucose level due to defects in insulin secretion, insulin action or both⁽¹⁾. It is projected to increase to 366 million by 2030⁽²⁾. Epidemiological studies have shown that diabetes mellitus is an independent risk factor for cardiovascular disease⁽³⁾. And also the cardiovascular death is more common in this population⁽⁴⁾. Glycated haemoglobin (HbA1c) is an indicator of long-term glycaemic control with the preceding of 2-3 months. Elevated HbA1c regarded as an independent risk factor for coronary heart disease (CHD) and stroke⁽⁵⁾⁽⁶⁾. The role of hyperglycaemia in CVD is supported by a direct correlation between fasting blood glucose (FBG) and cardiovascular events⁽⁷⁾⁽⁸⁾.

MATERIALS AND METHODS:

This cross sectional study conducted on confirmed (n=55) type 2 diabetes mellitus patients (31 males and 24 females) who visited our patients department of the A.C.S medical college & hospital (ACSMC&H), Chennai, India. From January to April 2016. American diabetic Association (ADA) criteria were used in defining diabetes mellitus⁽⁹⁾. Ethical clearance was taken from College Ethical Committee. Venous blood samples collected from all the patients after at least 10 hours fasting. The blood allowed to clot and then centrifuged at 3000 rpm for 15 min at room temperature. The HbA1c assayed by Ion exchange chromatography method. Fasting blood glucose (FBS), total cholesterol, triglycerides (TG), and high density lipoprotein (HDL) measured by enzymatic method by using the analyser Erba CHEM-7. The levels (LDL) and (VLDL) determined by Friedewald's formula. For serum lipid reference level National Cholesterol Education Programme (NCEP) Adult Treatment Panel III (ATP III) guideline was referred. The values of HbA1c were given as % of total hemoglobin and values of all other parameters were given in mg/dl. The results were evaluated by SPSS statistical package version 21. The results were expressed as Mean ± Standard deviation (S.D). Independent samples t test (2 tailed) was used to compare means of different parameters. Pearson's correlation test performed to examine various correlations. The P value (P<0.05) considered statistically significant. The diagnosed cases of Type 2 diabetes mellitus included in this study. Patients on lipid lowering drugs, Age below 18 years, Type 1 diabetics and endocrinopathies like Cushing syndrome, Thyroid disorders were excluded from this study. Patients with any diabetic complications were also excluded from study.

RESULTS:

Among the study population 31 were males and 24 were female's

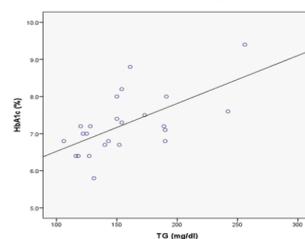
patients. Mean age of the males was (50.61 ± 13.21) and females (46.79 ± 9.79). The levels of HbA1c (%) differ significantly between males (7.68±1.37) (n=31) and females (7.23±0.80) (n=24). In male HbA1c showed positive correlation with FBS, PPBS and negative correlation with HDL which are highly significant (p<0.001). Whereas in female HbA1c showed positive correlation with FBS, TG and VLDL which are statistically significant (P<0.001). However there were no significant correlation observed between HbA1c, Total cholesterol, and LDL of both males and females. Table-1 shows the descriptive data of study population

Table-1: Descriptive data of study population

	Males	Females	p-value
Age	50.61 ± 13.21	46.79 ± 9.79	0.198
FBS	159.58 ± 91.94	141.38 ± 60.91	0.140
Total Cholesterol	189.32 ± 36.45	191.42 ± 28.53	0.256
Triacylglycerol	175.81 ± 81.46	155.33 ± 38.47	0.030*
HDL-c	39.90 ± 4.13	41.50 ± 3.33	0.184
LDL-c	114.28 ± 32.81	115.33 ± 17.5	0.121
VLDL-c	34.98 ± 16.33	30.75 ± 7.69	0.032*
HbA1-c	7.68 ± 1.37	7.23 ± 0.80	0.010*

p value <0.05 significant*

Fig-1: Correlation of HbA1c and Triacylglycerol



DISCUSSION:

Dyslipidaemia is the cause for increased risk of morbidity and mortality among type 2 diabetes mellitus patients. Hence we need to focus to control dyslipidaemia in this population. The DCCT trail has clearly shown that the reduction of HbA1c to less than 7% will reduce microvascular complications⁽¹⁰⁾. In our study we found high prevalence of hypertriglyceridemia in type 2 diabetics which are well known risk factor for cardiovascular diseases. Studies have reported that the cause

of dyslipidaemia in type 2 diabetes mellitus is due to ineffective function of insulin which affects the liver apolipoprotein production⁽¹¹⁾. The apolipoprotein regulates the enzymatic activity of lipoprotein lipase (LpL) and Cholesterol ester transport protein⁽¹¹⁾. A strong significant relationship of HbA1c with dyslipidaemia was observed in the present study shows the agreement with the study done by Erciyas et al⁽¹²⁾. The Diabetes complications and control trial (DCCT) established HbA1c as the gold standard of glycemic control (10). Studies have reported that reducing the HbA1c level by 0.2% could lower the mortality rate by 10%⁽¹³⁾.

CONCLUSION:

The study concluded that there was a significant difference between the level of lipid metabolites in diabetics of males and females. Thus, the results of our study suggest the importance of glycemic control in order to manage dyslipidaemia and risk for cardiovascular diseases in type 2 diabetics it is also concluded that HbA1c can be used as a predictor of dyslipidaemia in type 2 diabetics in addition to as glycemic control parameter. However we need furthermore studies with increased sample size and different ethnic group to conclude the statistical significant difference among females and males for predicting diabetic dyslipidemia.

REFERENCE:

1. American Diabetes Association. (2010). Diagnosis and classification of diabetes mellitus. *Diabetes care*, 33(Supplement 1), S62-S69.
2. Wild S, Roglic G, Green A, Sicree R, King H. Global Prevalence of Diabetes: Estimates for the year 2000 and projections for 2030. *Diabetes Care*. 2004; 27: 1047-1053.
3. Arshag D Mooradian. Dyslipidemia in type 2 diabetes mellitus. *Nature Clinical Practice Endocrinology and Metabolism* 2009; 5(3):150-59.
4. Sultan A, Thuan J F, Avignon A. Primary prevention of cardiovascular events and type 2 diabetes: should we prioritize our interventions? *Diabetes Metab* 2006; 32:559-67.
5. Selvin E, Coresh J, Golden SH et al (2005) Glycemic control and coronary heart disease risk in persons with and without diabetes: the atherosclerosis risk in communities study. *Arch Intern Med* 165:1910-1916.
6. Selvin E, Coresh J, Shahar E et al (2005) Glycemia (haemo- globin A1c) and incident of ischemic stroke: the Atherosclerosis Risk in Communities (ARIC) Study. *Lancet Neuro* 4:821-826
7. Fuller JH, Shipley MJ, Rose G et al (1983) Mortality from coronary heart disease and stroke in relation to degree of glycaemia: the Whitehall study. *BMJ* 287:867-870
8. Coutinho M, Gerstein HC, Wang Y, Yusuf S (1999) The relationship between glucose and incident cardiovascular events. A metaregression analysis of published data from 20 studies of 95,783 individuals followed for 12.4 years. *Diabetes Care* 22:233-240
9. American diabetes Association; The expert committee on the diagnosis and classification of diabetes mellitus. *Diabetes Care*, 2005; 28(1): s4- s36.
10. Diabetes Control and Complications Trial (DCCT): Results of Feasibility Study. The DCCT Research Group. *Diabetes Care*, 1987; 10(1):1-19
11. Goldberg, I.J. 1996. Lipoprotein lipase and lipolysis: central roles in lipoprotein metabolism and atherogenesis. *J. Lipid Res.*, 37: 693-707.
12. Erciyas, F., Taneli, F., Arslan, B., and Uslu, Y. 2004. Glycemic control, oxidative stress and lipid profile in children with type 1 Diabetes Mellitus. *Arch. Med. Res.* 35: 134-140.
13. Khaw, K.T., Wareham, N., Luben, R., Bingham, S., Oakes, S., Welch, A., 2001. Glycated haemoglobin, diabetes, and mortality in men in Norfolk cohort of European Prospective Investigation of Cancer and Nutrition (EPIC-Norfolk). *Br. Med. J.* 322:15-18