



Relationship between HbA1C and Left Ventricular Function in Type 2 Diabetes

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ABSTRACT

Diabetes mellitus is one of the leading public health problems and has profound effect on CVS. The risk of cardiovascular complications is increased by twofold to six fold in subjects with diabetes. The aim of this study is to evaluate the association between left ventricular dysfunction and indexes of glycemic control-glycosylated hemoglobin (HbA1C) in individuals with type 2 diabetes. Total 100 patients and 30 controls were selected in this study and the relationship between HbA1C levels and LV function was obtained.

INTRODUCTION

The level of chronic hyperglycemia, as determined by measurements of glycosylated hemoglobin, may also be an independent risk factor for coronary heart disease. A 1% increase in levels of glycosylated hemoglobin (HbA1C) doubled the increase in cardiovascular disease.⁴ HbA1C levels reflects the average blood glucose concentrations over a period of 2-3 months. The measurement is well standardized with less biological variability than plasma glucose levels. In this study, we examined the correlation between HbA1C and left ventricular function in both diabetic and non-diabetic patients.

MATERIALS AND METHODS

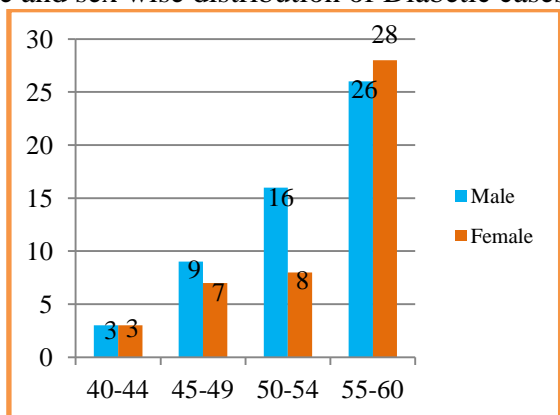
This prospective clinical study was done among 100 diabetic patients attending the outpatient department of general medicine at Rajah Muthiah Medical College Hospital during the period of oct.2014 to aug.2016. Those patients in the age group of 40-60 yrs and who has been diagnosed as

having diabetes according to WHO criteria were included in our study. HbA1C value >6.5% is considered as diabetic.³ A random sample of 30 non-diabetic patients whose age and sex were comparable to the study group was taken as control. Diabetic patients and control subjects having BP >140/90, s.cholesterol >240 mg/dl, history of smoking, alcoholism, heart and thyroid diseases, ECG changes and abnormal regional wall motions on 2D ECHO were excluded from the study. A detailed clinical history and complete general and systemic examination was taken. The following investigations were done; Resting 12 lead conventional ECG, HbA1c, S. cholesterol, S. triglyceride, Random blood sugar, Fasting blood sugar after an overnight fast, Post prandial blood sugar 2 hours after lunch, Chest X ray PA. 2D Echocardiography was done on all subjects and the following assessed: LV systolic function was measured using ejection fraction (EF%) the value < 55% was taken as index of systolic dysfunction. LV diastolic function was assessed by VE^a/VA^b

and the ratio < 0.75 was taken as mild diastolic dysfunction, VE/VA 0.75 to 1.5 was taken as pseudonormal or moderate diastolic dysfunction and ratio >1.5 was considered severe diastolic dysfunction. a=Peak velocity of early LV filling (V max E); b=Peak velocity of late LV filling (V max A).

OBSERVATION AND RESULTS

Age and sex wise distribution of Diabetic cases



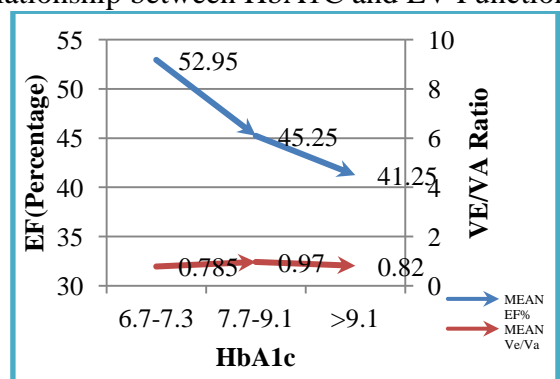
Comparison of HbA1C in Various Study

Study	HbA1C	
	Diabetes	Control
Vinereanu et al(n=70) ³	8	5.5
Kyong et al(n=103) ²	7.62	5.3
Mohammed et al(n=80) ⁷	8	5.9
Present Study(n=130)	7.68	5.56
p<0.0001(VHS)		

Relationship between HbA1C & LV Function in Diabetic Patients

HbA1C	MEAN EF%	MEAN Ve/Va
6.7-7.3	52.95%	0.785
7.4-9.1	45.25%	0.97
>9.1	41.25%	0.82

Relationship between HbA1C and LV Function



DISCUSSION

The commonest age group with diabetes in our study was 55-60 years age group in both diabetic male and females making up 54% of all diabetic patients (48.14% of all males and 60.8% of females).

In our study, mean value of HbA1C in diabetic was 7.68 as compared to 5.56 of control group. Mean value of HbA1C in study carried out by Kyong et al² was 7.62 as compared to 5.3 of control group. This value is almost similar to our finding. Mean value of HbA1C in study by Vinereanu et al³, and Mohammed et al⁷ was 8 which was higher than control group.

Patients with HbA1c>9.1 had mean LVEF 41.25% as compared to 52.95% of patients with HbA1c<7.4. Mean Ve/Va was 0.785 in good glycemic control and towards mild diastolic dysfunction, while mean Ve/Va of fair and poor glycemic control was 0.97 and 0.82 respectively which comes in pseudonormal range and suggests moderate diastolic dysfunction.

Studies carried out by Hameedullah et al 2009⁵ and Ali et al 2010⁶ also showed that with deterioration of glycemic control, left ventricular systolic and diastolic function deteriorates.

CONCLUSION

HbA1c is an independent risk factor for left ventricular systolic and diastolic dysfunction. Inverse relationship between HbA1c and LV function is demonstrated in this study. Hence HbA1C could be used as an important predictor for detecting left ventricular dysfunction in the early stage thereby preventing complications.

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