

**STUDY OF LEFT VENTRICULAR FUNCTION IN PATIENTS WITH TYPE 2 DIABETES**

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**ABSTRACT**

The aim of this study is to assess the left ventricular function of diabetic patients and to compare it with age and sex matched normal patients. 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. 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.

**Keywords:** Type 2 Diabetes, Ventricular Function

**1.INTRODUCTION**

Diabetes is now emerging as a worldwide epidemic. Type 2 diabetes mellitus (T2DM) is the predominant form of diabetes worldwide, accounting for 90% of cases globally (Kahn and Weir, 1994). The risk of cardiovascular complications has increased by twofold to six fold in subjects with diabetes. Overall life expectancy is about 7 to 10 years shorter than for people without diabetes mellitus because of increased mortality from diabetic complications (Kahn and Weir, 1994). Diabetics have abnormalities of left ventricular function in the absence of clinical heart disease (Kannel et al., 1982; Kannel, 1985; Seneviratne, 1977). The aim of this study is to assess the left ventricular function of diabetic patients and to compare it with age and sex matched normal patients.

**2. 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 (Isselbacher et al., 2015). 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,

Renal function test - Blood Urea, S creatinine and Electrolytes, Urine analysis, 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) (Braunwald, 2011; Ferro et al., 1993). Evaluation of left ventricular function in diabetics and control was done with help of echocardiography and values obtained were compared with various clinical and laboratory parameters.

**2.OBSERVATION AND RESULTS**

**Table. 1 Relationship between age and left ventricular systolic and**

Age in years	Diabetics (n=100)		Control (n=30)	
	Mean EF%	Mean VE/VA	Mean EF%	Mean VE/VA
40-44	51.66%	0.88	60%	1.33
45-49	49.70%	0.88	57.25%	1.20
50-54	47.69%	0.84	56%	1.18
55-60	46.48%	0.82	55%	1.12

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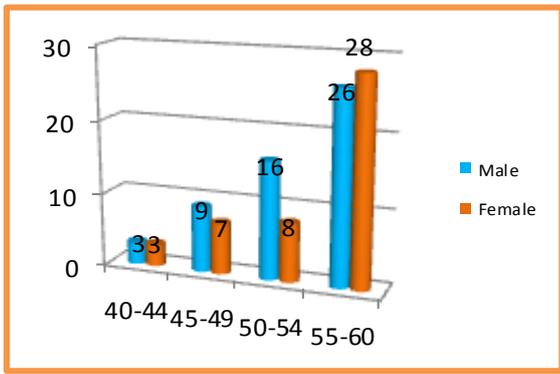


Fig.1 Age and sex wise distribution of Diabetic cases

Table 2 Prevalence of Systolic Dysfunction in Diabetic Patients

LVEF	Diabetics		
	Male	Female	Total
<55 (Dysfunction)	28	24	52
≥55 (N Function)	26	22	48

Z TEST for affect of diabetes on Systolic Function of heart

	TEST(DIABETIC PATIENTS)	CONTROL
EF% MEAN	X <sub>1</sub> =47.52	X <sub>2</sub> =55.17
STANDERD DEVIATION	SD <sub>1</sub> =10.54	SD <sub>2</sub> =3.61
NUMBER OF SUBJECTS	N <sub>1</sub> =100	N <sub>2</sub> =30

Z test value for this is 3.92 that correspond to p value of <0.0001. This shows association of diabetes with LV systolic dysfunction at significance level of 99.99%.

Table 3 Prevalence of diastolic Dysfunction in Diabetic Patients

VE/VA	Diabetes		
	Male	Female	Total
<0.75 & ≥1.5	38	26	64
0.75 to 1.5	16	20	36

Z TEST for affect of diabetes on Diastolic Function of heart

	TEST	CONTROL
VE/VA MEAN	X <sub>1</sub> =0.85	X <sub>2</sub> =1.07
STANDERD DEVIATION	SD <sub>1</sub> =0.26	SD <sub>2</sub> =0.32
NUMBER OF SUBJECTS	N <sub>1</sub> =100	N <sub>2</sub> =30

Z test value for this is 3.92 that corresponds to p value of <0.0001. This shows association of diabetes with LV diastolic dysfunction at significance level of 99.99%.

Table 3 Relationship between Systolic and Diastolic Function in Diabetes

EF%	Number	VE/VA (<0.75)	VE/VA (>0.75<1.5)	VE/VA (>1.5)
≥55	48	30	17	1
45-54	33	12	15	6
35-44	7	4	2	1
<34	12	10	2	0

#### 4.DISCUSSION

100 adult patients fulfilling our inclusion criteria and who visited the hospital from 2014 to 2016 were studied. Among them 54 were male and 46 were female. Mean EF% and mean VE/VA of control group was higher as compared to diabetics of the same age group. Mean VE/VA and mean EF decreases as age advances. This is due to effect of advancing age on the diastolic function of the heart. With advancing age diabetics showed poor systolic as well as diastolic function. This can also be explained on a basis that with increasing age of diabetic patients, duration and complications of diabetes also increases which may be responsible for poor LV function. In our study, mean value of HbA1C in diabetic was 7.68 as compared to 5.56 of control group. 48 diabetic patients had normal systolic function (EF≥55%). Out of which, 30 patients had mild diastolic dysfunction, 17 patients had moderate diastolic dysfunction and 1 patient had severe diastolic dysfunction. 33 diabetic patients had mild systolic dysfunction (EF <55 and ≥45). Out of which, 12 patients had mild diastolic dysfunction, 15 patients had moderate diastolic dysfunction and 6 patients had severe diastolic dysfunction. 7 diabetic patients had moderate systolic dysfunction (EF <45 and ≥35). Out of which, 4 patients had mild diastolic dysfunction, 2 patients had moderate diastolic dysfunction and 1 patient had severe diastolic dysfunction. 12 diabetic patients had severe systolic dysfunction (EF <35). Out of which, 10 patients had mild diastolic dysfunction and 2 patients had moderate diastolic dysfunction. These findings suggest that diabetic patients with preserved EF may have diastolic dysfunction and similarly, patients with severe systolic dysfunction may not have severe diastolic dysfunction. Prevalence of LV diastolic dysfunction (64%) in diabetic patients was found more than LV systolic dysfunction (52%).

#### 5.CONCLUSION

It is concluded that left ventricular dysfunction was present in significant proportion of asymptomatic diabetic patients. LV dysfunction increases with age and duration of diabetes. LV diastolic dysfunction was present in more number of patients than systolic dysfunction. 2D echocardiography is to be recommended to all type2 diabetic patients at the time of detection of diabetes and yearly thereafter, as early detection of left ventricular dysfunction has important diagnostic, prognostic and therapeutic implications.

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