

"Cardiac profile in Type 2 Diabetes Mellitus patients with normal resting ECG with special reference to Echocardiography and TMT"

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Abstract: AIMS AND OBJECTIVES- This study was undertaken to evaluate the extent of cardiac dysfunction by echocardiography assessment and TMT performance in patients of NIDDM with normal resting ECG.

Methodology- Fifty type-II diabetic patients were evaluated with normal resting ECG irrespective of age and sex admitted in the wards of Department of Medicine was selected for the study. The diagnosis of diabetes was made according to WHO criteria -Symptoms of diabetes plus random blood glucose concentration ≥ 11.1 mmol/L (200 mg/dl).Or Fasting plasma glucose ≥ 7.0 mmol/L (126 mg/dl).Or Two hour plasma glucose ≥ 11.1 mmol/L (200 mg/dl) during an oral glucose tolerance test. All subjects were subjected to routine and special investigations which included 12 lead ECG, TMT, and echocardiographic assessment.

Results: Out of the 50 patients, 33 patients (66%) had abnormal echocardiographic findings. 50% of the patients (25 out of 50 patients.) had diastolic dysfunction while 34% (17 out of 50 patients) had left ventricular hypertrophy. Diastolic dysfunction was highest in patients >60 years of age (90.91%) compared to 47.8% and 25% in the age group 46-60 years and 30-45 years respectively. The incidence of diastolic dysfunction was the highest (100%) in patients with diabetes duration >10 years. 40% of the patients had HbA1C level $>10\%$ of which 65% had diastolic dysfunction. TMT was positive in 05 out of 50 patients (10%). Out of the 17 females, two (11.76%) had positive TMT compared to three (9.09%) positive TMT out of 33 males.

Conclusion: The results of this study suggest that the incidence of left ventricular diastolic dysfunction is higher in NIDDM patients who are free of clinically detectable heart disease. It was found that the incidence of diastolic dysfunction had a strong correlation with the age, duration of diabetes, HbA1C level and diabetic complications. Stress test positivity in type-2 diabetic patients didn't show any correlation with sex, age, addiction, duration of diabetes, and systolic blood pressure. In the present study, it was also found that asymptomatic coronary heart disease occurs in type 2 diabetic patients. Hence it is advisable to screen these patients by TMT and confirm/rule out coronary heart disease by coronary angiography.

Key words-Normal resting ECG, Type II DM and Cardiac Evaluation.

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I. Introduction

The American Diabetes Association has designated diabetes as cardiovascular disease equivalent. The increased risk of morbidity and mortality due to cardiovascular disease is associated with abnormalities in glucose metabolism^{1,11}. Both ischemic heart disease and a true diabetic myocardial disease developing in long standing diabetic subjects may be responsible for heart failure in diabetics^{1,4}. The Framingham study had shown that diabetic men had a 2.4 fold increased incidence of heart failure and rising to 5.1 fold increased incidence in diabetic women ^{1,5}. Although systolic and diastolic functions of the heart are impaired in diabetes, many studies have shown that LV diastolic abnormalities are the most common and may in fact precede the development of systolic abnormality^{2,3,6}. Detection of such asymptomatic LV dysfunction is of importance so that early treatment with ACE Inhibitors may help the patients.^{7, 10}

Keeping this in view, it was thought to study patients of type 2 diabetes mellitus for analysis of cardiac function noninvasively by measuring LVEF, IVRT and left ventricular filling patterns (transmitral- flow velocity pattern) obtained by echocardiography and Doppler study and asymptomatic coronary heart disease by tread mill test .^{8, 9}

II. Materials and Methods-

The present study titled "Cardiac Profile in Type-2 Diabetes Mellitus Patients with Normal Resting ECG with Special Reference to Echocardiography and TMT" was carried out in patients attending the MOPD

and those admitted in Department of Medicine S.S. Medical College and Associated S.G.M. Hospital, Rewa (M.P.) with following *inclusion criteria*-

A random sample of 50 patients of type-II diabetes mellitus with normal resting ECG irrespective of age and sex admitted in the wards of Department of Medicine were selected for the study.

The diagnosis of diabetes was made according to WHO criteria which include:- Symptoms of diabetes plus random blood glucose concentration ≥ 11.1 mmol/L (200 mg/dl). Or Fasting plasma glucose ≥ 7.0 mmol/L (126 mg/dl). Or Two hour plasma glucose ≥ 11.1 mmol/L (200 mg/dl) during an oral glucose tolerance test.

METHODS:

1. Detailed history of the subjects with special reference to symptoms pertaining to diabetes mellitus and coronary risk factors (addiction, hypertension, dyslipidemia, family history of coronary artery disease etc) were recorded.
2. Clinical examination emphasized measurement of height, weight, BMI and blood pressure. Height was measured in meters and weight recorded in kilograms using a calibrated weighing machine. At least two recordings of blood pressure at 5 minutes interval as per WHO Guidelines were taken.
3. All subjects were subjected to routine and special investigations which included.
 - (a) Routine blood investigations – Hb%, TLC, DLC.
 - (b) Blood biochemistry –blood sugar, blood urea., s.creatinine, s.cholesterol,HbA1C
 - (c) Urine examination.
 - (d) Ophthalmological evaluation
 - (e) X-ray chest PA view.
 - (f) Standard 12 lead electrocardiogram.
 - (g) Treadmill stress testing.
 - (h) Echocardiography including pulse wave Doppler

Patients were evaluated by 12 lead ECG performed with proper standardization and those with an abnormal ECG were excluded from the study.

Observations: In this study, Echocardiography and TMT were done in 50 type-2 diabetes mellitus patients with normal resting ECG. After analyzing the data following observations were made.

**Table - 1
Echocardiographic Evaluation in the Study Group**

	Number of Cases (n=50)	% of cases
Normal	17	34%
Abnormal	33	66%
1. Diastolic Dysfunction	25	50%
2. LVH	17	34%

Z=-2.42, Not significant

The above table shows that out of the 50 patients, 33 patients (66%) had abnormal echocardiographic findings. 50% of the patients (25 out of 50 patients.) had diastolic dysfunction while 34% (17 out of 50 patients) had left ventricular hypertrophy.

**Table – 2
TMT Evaluation in the Study Group**

Sex	Number of Patients (%)	Tread Mill Test	
		Positive (%)	Negative (%)
Female	17 (34%)	02 (11.76%)	15 (88.24%)
Male	33 (66%)	03 (9.09%)	30 (90.91%)
Total	50	05	45

$\chi^2 = 0.08, p=0.76, \text{Not Significant}$

The above table shows that most of the cases were males (66%) but positive stress test were more in females (11.76%) compared to that in males(9.09%).

