

## Exercise Electrocardiogram Testing in Asymptomatic Patient with Diabetes and Left Ventricular Diastolic Dysfunction

### Abstract

**Objectives:** The main objective of the study is to find the exercise electrocardiogram testing in asymptomatic patient with Type-II diabetes and left ventricular diastolic dysfunction.

**Material and methods:** This descriptive study was conducted in Allama Iqbal Memorial Teaching Hospital, Sialkot during January 2019 to November 2019. The data was collected from 50 patients of type II DM. These all patients has normal electrocardiogram (ECG) and normal systolic function. **Results:** The data was collected from 50 patients of both genders.

The mean age of the patients was  $47.83 \pm 5.61$  years. After getting data the results were divided into two parts. There were 25 patients in group A and 25 patients group B. The mean duration of diabetes is  $2.5 \pm 5.61$  years. There were 20 males and 30 females in this data. There were no significant difference of fasting blood sugar in both groups. There was no statically significant difference between two groups regarding left atrial dimension, aortic root dimension, LV end-diastolic dimension, ejection and LV mass. **Conclusion:** It is concluded that coronary supply route sicknesses is a typical issue in DM, with diastolic brokenness and increment uniquely in patients with positive pressure practice electrocardiography.

**Comment [MOU1]:** rewrite scientifically

### Introduction

Patients with type 2 diabetes often complain of fatigue and reduced exercise capacity which might be related to other illness conditions, for example, hypertensive left ventricular hypertrophy as well as coronary supply route sickness, and the resulting improvement of cardiovascular breakdown, however the presence of diabetes may freely add to the hindered

**Comment [MOU2]:** replaced by "such as"

practice limit. A few examinations have uncovered that activity limit diminishes in patients with type 2 diabetes and is related with cardiovascular mortality [1]. The proof demonstrates that in patients with type 2 diabetes, myocardial harm with fibrosis and apoptosis, disappointment in energy utilization, little vessel illness and autonomic neuropathies influence diastolic capacity before systolic capacity which is autonomous of hypertension and coronary corridor infection and prompts diabetic cardiomyopathy [2].

Individuals with diabetes (PWD) are at expanded danger of creating both miniature and macrovascular difficulties, which are lessened with legitimate glycaemic treatment. Contrasted and individuals without diabetes, men and, particularly, ladies with diabetes have diminished future (six to eight years less) [3]. One necessities to remember however that these individuals don't bite the dust from diabetes in essence but instead from cardiovascular sickness (CVD). At the hour of determination of type 2 diabetes (T2D), numerous patients as of now have at least one extra **danger factors** for macrovascular illness (stoutness, hypertension, **dyslipidaemia**, and smoking) and many have proof of plain atherosclerosis (past myocardial dead tissue (MI), ischaemic stroke, ischaemic changes on electrocardiogram (ECG), or fringe vascular infection) [4].

Doppler echocardiography is one of the most valuable **clinical apparatuses** for the appraisal of LV diastolic capacity. Doppler lists of LV filling are utilized for analytic purposes as well as for building up **guess** and assessing the impact of treatment. LV diastolic brokenness **may speak** to the primary phase of diabetic cardiomyopathy strengthening the significance of the early assessment of diastolic capacity in individual with diabetes [5].

Diabetes is related with expanded cardiovascular **confusions**, the most widely recognized of which are ischemic cardiomyopathy and LV brokenness. Diabetes is likewise connected with **HF**, basically through its association with hypertension and coronary vein disease.[8]

Diabetes mellitus (DM) **speeds up** the cycle of coronary atherosclerosis and practical and basic heart disabilities [6].

DM isn't just a **huge autonomous danger factor** for the improvement of atherosclerotic ischemic coronary illness or ventricular hypertrophy, yet it is likewise ready to trigger a diabetic cardiomyopathy because of some metabolic cycles: restraint of exchanging inside the cardiomyocyte from **free unsaturated fat (FFA)** to glucose digestion, dysregulation of FFA digestion with expanded take-up, diminished FFA oxidation, decrease of peroxisome proliferator-**actuated** receptor (PAPAR), increment of PAPAR-g and insulin-obstruction, and expanded intracellular lipogenesis which prompts cardiomyocyte lipotoxicity [7].

**Comment [MOU3]:** activated

## Objectives

The main objective of the study is:

- To **find** the exercise electrocardiogram testing in asymptomatic **patient** with Type-II diabetes and left ventricular diastolic dysfunction.

**Comment [MOU4]:** replaced with "analyse"

**Comment [MOU5]:** patients

## Material and methods

This descriptive study was conducted in Allama Iqbal Memorial Teaching Hospital, Sialkot during January 2019 to November 2019. The data was collected from 50 patients of type II DM. These all patients has normal electrocardiogram (ECG) and normal systolic function.

## Exclusion criteria

- Patients suffering from hypertension, ECG abnormalities and muscular disorder were excluded from this study.

## Inclusion criteria

- All the patients who have type II DM, and ready to participate in the study.

**Comment [MOU6]:** can mention the genders and age group

## Data collection

The data was collected from 50 patients. All patients went through complete reverberation Doppler study utilizing an industrially accessible echocardiography machine. LV measurements, left atrial measurements, divider thickness and launch part were estimated. Besides, transmitral stream was finished by beat wave Doppler between the tips of mitral valve flyers from four-chamber see measure top E wave speed, top A wave speed, E/A proportion, E wave deceleration time, and isovolumic unwinding time (IVRT). Exercise ECG was done to all patients to identify ischemic coronary illness and those with positive exercise ECG will inclined to coronary angiography.

**Comment [MOU7]:** better to replace with "diagnose"

The data was collected and analysed by using excel 2010.

**Comment [MOU8]:** mention the statistical software used with version number

## Results

The data was collected from 50 patients of both genders. The mean age of the patients was  $47.83 \pm 5.61$  years. After getting data the results were divided into two parts. There were 25 patients in group A and 25 patients group B.

**Comment [MOU9]:** nor "results", the study subjects(patients)

**Comment [MOU10]:** better to mention the basis of grouping

**Comment [MOU11]:** groups

Group A: diabetic patients with LV diastolic dysfunction with negative stress ECG

Group B: patients with LV diastolic dysfunction with positive stress ECG.

**Comment [MOU12]:** diabetic?

The mean duration of diabetes is  $2.5 \pm 5.61$  years. There were 20 males and 30 females in this data. There were no significant difference of fasting blood sugar in both groups. There was no statically huge contrast between two gatherings with respect to left atrial measurement, aortic root measurement, LV end-diastolic measurement, launch and LV mass. The exhibition of activity stress test has appeared in diabetics, a lower increment of E' speed ( $12.02 \pm 1.6$

**Comment [MOU13]:** was

**Comment [MOU14]:** statistically

**Comment [MOU15]:** spell check

cm/sec versus  $16,7 \pm 1,3$  cm/s,  $p < 0,01$ ), slight increment of A' speed ( $p < 0,01$ ) contrasted and control subjects.

**Table 01:** Tissue Doppler Echocardiography characteristics of both groups after the stress test

| Parameters  | Group A          | Group B         | P          |
|-------------|------------------|-----------------|------------|
| E' (cm/sec) | $12.02 \pm 1,6$  | $16.7 \pm 1.3$  | $P < 0.01$ |
| A' (cm/sec) | $12.35 \pm 1,8$  | $13.1 \pm 1.2$  | $P < 0.02$ |
| E'/A'       | $0.89 \pm 0.1$   | $1.8 \pm 1.2$   | $P < 0.01$ |
| S' (cm/sec) | $10.22 \pm 0.95$ | $12.92 \pm 1.2$ | $P < 0.01$ |

**Comment [MOU16]:** mention sample size as 'n' in each group in the table

In group A there were 25 patients who were negative stress exercise in group A and 54% in group B. The statistical analysis showed a significant increase in the number of stress exercise ECG-positive patients among diabetic patients with diastolic dysfunction than diabetic patients without diastolic dysfunction ( $P < 0.001$ ).

**Comment [MOU17]:** need correction

**Table 02:** Stress exercise ECG in group A and group B

|                     | Group A<br>% age | Group B<br>% age | X <sup>2</sup> | P-value |
|---------------------|------------------|------------------|----------------|---------|
| Exercise ECG        |                  |                  |                |         |
| +ve                 | 0                | 46               | 37             | 0.001   |
| -ve                 | 100              | 54               |                |         |
| Functional Capacity |                  |                  | 15.91          | 0.100   |
| Poor                | 0.1              | 9.1              |                |         |
| Average             | 9.9              | 67.8             |                |         |
| Good                | 38.9             | 12.3             |                |         |
| Excellent           | 61.1             | 11.2             |                |         |

**Comment [MOU18]:** need correction

## Discussion

Diabetes is notable to altogether expand CVD hazard, yet can't be viewed as a CHD same, because of extraordinary heterogeneity of the patients. All things considered, life-time danger of CHD is by all accounts very high in practically all individuals with the infection, which calls for individualized methodology and assessment for the presence and conceivable treatment of an incredible assortment of other as often as possible coinciding danger factors that can expand this danger [8].

**Comment [MOU19]:** sentence should not be structured

**Comment [MOU20]:** better to use scientific terms

Aside from hazard factor treatment, be that as it may, the estimation of obtrusive treatment of coronary atherosclerosis (with the exception of the instance of intense coronary conditions) stays disrupted, on the grounds that all earlier randomized preliminaries have restrictions and are pointing towards equipoise, and accordingly, routine screening for quiet CHD in asymptomatic people with DM isn't right now suggested, as long as cardiovascular danger factors are dealt with [9].

Conversely, old style measures dependent on CE don't appear to have a similar capacity. Moreover, this irregularity is by all accounts related to the diabetic cardiomyopathy. Almost certainly, metabolic variations from the norm may assume a significant job [10]. Exploratory data from creature models of diabetes unequivocally uphold a causal part of insulin obstruction in the advancement of diastolic brokenness. Treatment with metformin forestalled the improvement of cardiomyocyte brokenness [11]. In an insulin-safe pre-diabetic rodent model, Mizushige et al. seen that the variations from the norm of diastolic filling happened before the advancement of straight to the point hyperglycaemia [12].

Histopathology contemplates proved expanded myocyte fibrosis and collagen statement, recommending that these auxiliary adjustments assume a significant function in the advancement of diastolic brokenness [13].

## Conclusion

It is concluded that coronary supply route sicknesses is a typical issue in DM, with diastolic brokenness and increment uniquely in patients with positive pressure practice electrocardiography. Patients with positive pressure practice electrocardiography and coronary corridor infection apparent by coronary angiography had a practically identical diastolic capacity record to those with negative pressure practice electrocardiography. Doppler imaging application may legitimize routine screening for diastolic brokenness in diabetic patients dared to have healthy hearts.

## References

1. Vinereanu D, Nicolaidis E, Tweddel AC., et al. Subclinical left ventricular dysfunction in asymptomatic patients with type II diabetes mellitus, related to serum lipids and glycated haemoglobin. Clin Sci 2003; 105: 591-599.
2. Diabetes Epidemiology Research International (DERI) Mortality Study Group: International evaluation of cause-specific mortality and IDDM. Diabetes Care. 1991; 14: 55-60.
3. Mark KH, Faxon DP. Clinical studies on coronary revascularization in patients with type 2 diabetes. Eur Heart J. 2003; 24: 1087-1103.
4. Fang ZY, Yuda S, Anderson V., et al. Echocardiographic detection of early diabetic myocardial disease. J Am Coll Cardiol. 2003; 41: 611-617
5. Piccini JP, Klein L, Gheorghiade M, Bonow RO. New insights into diastolic heart failure: Role of diabetes mellitus. Am J Med 2004;116 Suppl 5A: 64S-75S
6. Poirier P, Bogaty P, Garneau C, Marois L, Dumesnil JG. Diastolic dysfunction in normotensive men with well-controlled type 2 diabetes: Importance of maneuvers in

echocardiographic screening for preclinical diabetic cardiomyopathy. *Diabetes Care* 2001;24:5-10.

7. Mytas DZ, Stougiannos PN, Zairis MN, Foussas SG, Pyrgakis VN, Kyriazis IA. Diabetic myocardial disease: Pathophysiology, early diagnosis and therapeutic options. *J Diabetes Complications* 2009;23:273-82
8. Nichols GA, Gullion CM, Koro CE, Ephross SA, Brown JB. The incidence of congestive heart failure in type 2 diabetes: An update. *Diabetes Care* 2004;27:1879-84.
9. Bauters C, Lamblin N, Mc Fadden EP, Van Belle E, Millaire A, de Groote P. Influence of diabetes mellitus on heart failure risk and outcome. *Cardiovasc Diabetol* 2003;2:1.
10. Rathod MI, Sharma SK, Jain RK, Joshi RS, Mangudkar SS. A Study of Left Ventricular Diastolic Dysfunction in Patients with Diabetes Mellitus; 2010.
11. Ilercil A, Devereux RB, Roman MJ, Paranicas M, O'grady MJ, Welty TK, *et al.* Relationship of impaired glucose tolerance to left ventricular structure and function: The strong heart study. *Am Heart J* 2001;141:992-8.
12. Eren M, Gorgulu S, Uslu N, Celik S, Dagdeviren B, Tezel T. Relation between aortic stiffness and left ventricular diastolic function in patients with hypertension, diabetes, or both. *Heart* 2004;90:37-43
13. Grewal J, McCully RB, Kane GC, Lam C, Pellikka PA. Left ventricular function and exercise capacity. *JAMA* 2009;301:286-94