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A Study of Diastolic Dysfunction in Asymptomatic Normotensive Patients of Type 2 Diabetes Mellitus

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Abstract: ***This prospective observational study evaluated the prevalence of left ventricular diastolic dysfunction (LVDD) among asymptomatic normotensive patients with type 2 diabetes mellitus. One hundred patients fulfilling predefined inclusion criteria were enrolled and underwent echocardiographic assessment with tissue Doppler imaging. LVDD was identified using established echocardiographic parameters. LVDD was detected in 63% of participants, indicating a high burden of subclinical cardiac involvement. Increasing age and longer duration of diabetes were associated with a greater frequency of LVDD. The findings suggest that asymptomatic cardiac dysfunction is common in patients with type 2 diabetes mellitus even in the absence of hypertension or overt cardiovascular disease. Early echocardiographic screening may facilitate timely intervention and improve long-term cardiovascular outcomes.***

Keywords: Type 2 Diabetes Mellitus; Diastolic Dysfunction; Diabetic Cardiomyopathy; Echocardiography; Tissue Doppler Imaging; Left Ventricular Dysfunction

1. Introduction

Type 2 Diabetes Mellitus (T2DM) is a chronic condition characterized by hyperglycemia, leading to multiple microvascular and macrovascular complications. Diabetic cardiomyopathy is increasingly recognized as a distinct entity, defined as ventricular dysfunction in the absence of coronary artery disease, valvular disease, or hypertension. Diastolic dysfunction often serves as the earliest structural and functional abnormality in these patients. Understanding this asymptomatic state is vital for preventing the progression to overt congestive heart failure.

2. Aims and Objectives

The primary aim of this study was to evaluate the prevalence of Left Ventricular Diastolic Dysfunction (LVDD) in asymptomatic, normotensive patients diagnosed with T2DM. Secondary objectives included analyzing the correlation of LVDD with metabolic factors, age, duration of diabetes, and glycemic control.

3. Materials and Methods

Inclusion & Exclusion Criteria
This prospective observational study was conducted at the Department of Medicine, Baroda Medical College/Civil Hospital, Vadodara, over a 24-month period.

Inclusion Criteria: Patients diagnosed with T2DM according to ADA criteria, asymptomatic for cardiovascular disease, normotensive (BP < 130/80 mmHg), and providing informed consent.

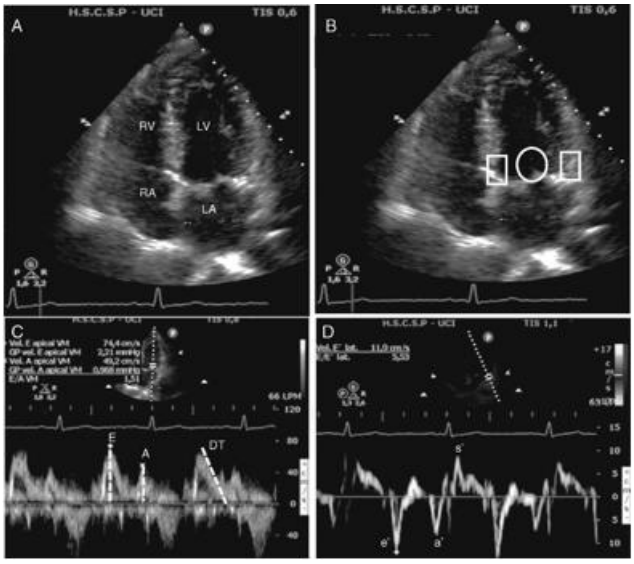
Exclusion Criteria: Known coronary artery disease (via History or Trademil test), valvular heart disease, chronic kidney disease, documented hypertension on medication, or pregnancy.

4. Results

The study enrolled 100 patients. LVDD was observed in 63% of the study population.

Diastolic dysfunction is defined by the presence of at least 2 of the following 4 abnormal echocardiographic parameters:

Parameter	Abnormal Criterion
Average E/e' ratio	>14
Septal e' velocity	< 7 cm/s
Lateral e' velocity	< 10 cm/s
LA maximum volume index	> 34 mL/m²



5. Discussion

The high prevalence of LVDD (63%) observed in our study aligns with global literature. The pathophysiology involves advanced glycation end-products (AGEs) and PKC pathway activation, which decrease cardiomyocyte compliance. These changes occur silently, emphasizing the need for echocardiographic screening even in the absence of cardiac symptoms. The observed association between age, duration of diabetes, and LVDD highlights the progressive nature of diabetic cardiomyopathy.

6. Conclusion

Diastolic dysfunction is a prevalent, silent complication of

T2DM. Regular screening using echocardiography with tissue Doppler imaging is recommended for all T2DM patients to identify high - risk individuals early. Lifestyle and glycemic management are critical in delaying or reversing these functional cardiac changes.

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