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Original Research Article

PREVALENCE OF DIASTOLIC DYSFUNCTION AMONG ASYMPTOMATIC NORMOTENSIVE DIABETICS

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Abstract

LV diastolic dysfunction is one of the earliest signs of myocardial involvement in diabetes and hence, an important component in diabetic cardiomyopathy. It is also an important predictor of heart failure and long term mortality. Diabetics have a 2.5 fold inceased risk of heart failure. It is suggested that early detection of diastolic dysfunction by echocardiography can lead to institution of early measures for prevention of heart failure. The aim of this study is to find the prevalence of diastolic dysfunction in asymptomatic diabetic patients by echocardiography.

Keywords: Diastolic dysfunction, diabetes mellitus

Introduction

Type 2 DM leads to a variety of subclinical target organ impairment that result in an increased incidence of cardiovascular disease. An important example is diabetic cardiomyopathy where heart failure occurs in the absence of coronary artery disease or hypertension. In this entity, diastolic dysfunction appears long before systolic dysfunction.[1]The prevalence of heart failure in diabetes is to the tune of 30%.[2] Diastolic dysfunction is present in about 50% of adolescents or young adults with diabetes of duration about 10 years. It has been seen that of diabetic patients with systolic dysfunction, 83% had impaired diastolic function, whereas only 30% of diabetic patients with diastolic dysfunction had systolic dysfunction.

"Unrecognized diabetic cardiac impairment" is identified from, among other findings, echocardiographic evidence of diastolic dysfunction.[3]A close evaluation of diastolic function is necessary for identification of patients in the presymptomatic phase and subsequent close follow up and treatment.

Materials and methods:

100 consecutive asymptomatic patients of diabetes attending the outdoor patient department of MKCG Medical College, Berhampur were included in the study. The control group consisted of 50 healthy persons. All patients were subjected to lab investigations including complete blood count, fasting and postprandial blood sugar,HbA1c,renal function test, liver function test and lipid profile.A resting ECG was recorded.BMI was calculated as weight in kg divided by height in metre (squared).

Transthoracic echocardiography (TTE) was performed by an experienced cardiologist using Philips HD7XE echocardiography machine with 3.5 MHz transducer probe. Echocardiography was performed on all participants and assessment of both systolic function and diastolic function was done.The parameters assessed were peak E velocity, peak A velocity, E/A ratio(normal 1-2), isovolumic relaxation time(IVRT)(normal 60-100 ms) ,deceleration time(DT)(normal 150-220 ms).E/e' was also assessed using Tissue Doppler imaging.

Diastolic dysfunction was categorised into grade 1(delayed relaxation), grade 2(pseudonormalisation), grade 3 (reversible restrictive) and grade 4(irreversible restricitive).

Exclusion criteria:

Patients of hypertension and known heart disease such as coronary artery disease, valvular heart disease and other causes of diastolic dysfunction such as constrictive pericarditis and restrictive cardiomyopathy were excluded from the study.

Results:

Out of 100 diabetics,68 were male and 32 female whereas out of 50 controls,25 were male and 25 female. The mean age of diabetics was 42.7 years whereas the mean age of controls 37.3 years.6 patients had type I diabetes. The duration of diabetes was less than 1 year in 10 patients,1 to 5 years in 36 patients and more than 5 years in 54 patients.76 patients had normal BMI,20 patients were overweight and 4 were obese.HbA1c <7,7-8 and >8 was observed in 74,20 and 6 patients respectively.

Diastolic dysfunction was observed in 68 out of 100 diabetics but in only 6 out of 50 nondiabetics ($p < 0.05$).

Table 1: comparison of e/a ratio between diabetics and nondiabetics

	DIABETICS	NONDIABETICS
E/A>1	68	6
E/A<1	32	44

Discussion:

Diabetic cardiomyopathy is considered to be a unique entity with multiple putative mechanisms such as microvascular disease, autonomic dysfunction, metabolic disorders, and interstitial fibrosis.LV diastolic dysfunction may represent the first stage of diabetic cardiomyopathy.[4]Diabetes causes diastolic dysfunction by derangements in myocardial relaxation and increased stiffness due to metabolic abnormalities and ultrastructural changes,largely due to circulating advanced glycation end products(AGEs).

The current study found the mean age of diabetics to be 42.7 years. Indians are known to develop diabetes 10 years earlier than their western counterparts with 46% of patients being under 40 years of age. The average age of onset of diabetes is 42.5 years. Also, a WHO report estimated that in developing countries including India,the largest number of diabetics is in 41-60 years age group.[5]The number of people with diabetes in India has increased from 26 million in 1990 to 65 million in 2016.

In our study,68 patients were male and 32 were female. The study by Kabeer et al found 64% males and 36% females.[6]Increased prevalence in males was also shown by Patil MB et al who showed 56% males and 44% females in study population.[7]

The percentage of overweight and obese individuals in our study was 20% and 4% respectively. Vasanthakumar reported the prevalence of overweight in diabetes to be 19%.[8]

As in previous studies, an E:A ratio value of 1.0 was arbitrarily chosen as the lower limit to detect impaired relaxation.[9]In our study, diastolic dysfunction was seen in 68% patients. In a study of 127 asymptomatic patients of diabetes, Patil et al reported the incidence of diabetes to be 54.33%.[7]Burji et al found diastolic dysfunction in 32(64%) of patients.[10]Senthil et al reported the prevalence to be 30% as did Zarich et al .[11,12]Pourier et al studied 46 normotensive men with diabetes and found diastolic dysfunction in 28(60%).[13]Fawad Randhawa et al studied 150 diabetics with normal blood pressure and found the prevalence of diastolic dysfunction to be 48%.[14]

Conclusion:

Asymptomatic diastolic dysfunction is found in 68% of diabetics as compared to 6% of nondiabetics. Early diagnosis and institution of treatment is likely to improve both morbidity and mortality related to heart failure.

Ethical clearance: from MKCG Medical College Ethical Clearance Committee

References

1. Howard BV, Rodlriguez BL, Bennett PH, Harris MI, Hamman R. Prevention conference VI: diabetes and cardiovascular disease: writing group I: epidemiology. Circulation 2002;105;132-7.
2. Ofstad AP, Atar D, Gullestad L, Langslet G, Johansen OE. The heart failure burden of type 2 diabetes mellitus-a review of pathophysiology and interventions. Heart Fail Rev. 2018;23(3):303-323. doi:10.1007/s10741-018-9685-0
3. Rosano GM, Vitale C, Seferovic P. Heart Failure in Patients with Diabetes Mellitus. *Card Fail Rev*. 2017;3(1):52-55. doi:10.15420/cfr.2016:20:2
4. Raev DC: Which left ventricular function is impaired earlier in the evolution of diabetic cardiomyopathy? An echocardiographic study of young type I diabetic patients. Diabetes Care17 : 633-639,1994
5. Sreelatha M, Kumar VS, Shekar GC, Shekar VC. Study of Thyroid Profile in Patients with Type 2 Diabetes Mellitus. 2017;5:211–20.
6. Ansari MSHK, Shaikh AFAH.Prevalence of left ventricular diastolic dysfunction by echocardiography in type II diabetes mellitus patients. Int J Adv Med 2019;6:1334-9.
7. Patil VC, Patil HV, Shah KB, Vasani JD, Shetty P. Diastolic dysfunction in asymptomatic type 2 diabetes mellitus with normal systolic function. J Cardiovasc Dis Res 2011;2:213-22.
8. Differential risk factors and morbidity/mortality pattern in type 2 diabetes: A study among two Mendelian populations with different ancestry (India).Imnameren Longkumer, Naorem Kiranmala Devi,Benrithung Murry, Kallur Nava Saraswathy.Diabetes & Metabolic Syndrome: Clinical Research & Reviews. 2020; 14(6): 1769).
9. Rakowski H, Appleton C, Chan KL, Dumesnil JG, Honos G, Jue J, Koilpillai C, Lepage S, Martin RP, Mercier LA, O'Kelly B, Prieur T, Sanfilippo A, Sasson Z, Alvarez N, Pruitt R, Thompson C, Tomlinson C: Canadian consensus recommendations for the measurement and reporting of diastolic dysfunction by echocardiography: from the Investigators of Consensus on Diastolic Dysfunction by Echocardiography. J Am Soc Echocardiogr**9**: 736-760, 1996.
10. Patil MB, Burji NP. Echocardiographic evaluation of diastolic dysfunction in asymptomatic type 2 diabetes mellitus. J Assoc Phys India 2012; 60: 23-6.
11. Senthil N, Vengadakrishnan K, Vankineni SS, Sujatha S. Diastolic Dysfunction in Young Asymptomatic Diabetics Patients. Int J Sci Stud 2015;3(7):226-229.
12. Zarich SW, Nesto RW. Diabetic cardiomyopathy. Am Heart J 1989;118:1000-12
13. Poirier P, Bogaty P, Garneau C. Diastolic Dysfunction in Normotensive Men with Well-Controlled Type 2 Diabetes Importance of maneuvers in echocardiographic screening for preclinical diabetic cardiomyopathy. Diabetes Care 2001 Jan; 24(1): 5-10
14. Randhawa FA, Hussnain MT, Nazir S et al. Frequency of Diastolic Dysfunction in Asymptomatic, Normotensive Type 2 Diabetic Patients. J Ayub Med Coll Abbottabad 2014; 26 (1)