ISSN- O: 2458 - 868X, ISSN–P: 2458 – 8687
Index Copernicus Value: 68 . 16
PubMed - National Library of Medicine - ID: 101731606

International Journal of Medical Science and Innovative Research (IJMSIR)
IJMSIR : A Medical Publication Hub
Available Online at: www.ijmsir.com
Volume – 4, Issue – 3, June - 2019, Page No. : 178 – 181

To Study the Co-Relation between Diabetic Retinopathy and LVDD at Tertiary Care Hospital, Jodhpur, Rajasthan

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Type of Publication: Original Research Paper

Conflicts of Interest: Nil

Abstract

Background: Patients with diabetes mellitus have high cardiovascular morbidity and mortality. Left ventricular diastolic dysfunction, a basic characteristic of diabetic heart disease (diabetic cardiomyopathy), appears before the development of systolic dysfunction, suggesting that diastolic markers might be sensitive for early cardiac injury.

Methods: This study was conducted on 75 Type 2 normotensive diabetes mellitus patients attending the Department of Internal Medicine at DR SN Medical College & MDM Hospital, Jodhpur and compared to the control group (75 patients). The study subjects were selected from the Diabetics Clinic, General medical wards and OPD's.

Results: Out of 75 cases, 18 cases show retinopathy (24%).However the relation of retinopathy with LVDD was statistically significant (p value <0.01%) as 16 out of 18 (88.89%) cases with diabetic retinopathy showed LVDD.

Conclusion: Early diagnosis and institution of treatment for LVDD in diabetic patients will reduce the morbidity and improve the outcomes by preventing future development of heart failure.

Keywords: Type2 diabetes mellitus, Left ventricular diastolic dysfunction, control group, diabetic retinopathy (DR).

Introduction

Diabetes mellitus (DM) refers to a group of common metabolic disorder that shares phenotype of hyperglycemia. In India, the prevalence rates are estimated to be around 20% in cities, and recent figures showed surprising increasing rates in rural areas. To ascertain the true prevalence in any community, it is essential that there must be standardized methods for the diagnosis with proper acceptable criteria so that the results are comparable. Two broad categories of DM are Type 1 or Type 2. Type 1 is the result of complete or near total insulin defi ciency. Type 2 DM is a heterogeneous disorder characterized by variable degrees of insulin resistance, impaired insulin secretion, and increased glucose production.[1-3]

This metabolic dysregulation associated with DM causes secondary pathophysiologic changes in multiple organ system that leads to long-term chronic complications

which account for much of the morbidity and mortality, attributed to the disease. An early diagnosis on that account can be of great help to prevent or delay the development of these complications. This underlines the necessity of early diagnosis.[4]

Presently very few studies have been carried out in India to study the relation between diabetic retinopathy and LVDD. So the present study was undertaken to evaluate relation between diabetic retinopathy and LVDD.

Methodology

This case control study was conducted on 75 Type 2 normotensive diabetes mellitus patients attending the Department of Internal Medicine at DR SN Medical College & MDM Hospital, Jodhpur and compared to the control group (75 patients). Participants after understanding the study protocol and procedures were asked to given their written consents for the study. The study is a hospital based cross-sectional study where the study populations were selected from the Diabetics Clinic, General medical wards and OPD's.

For study group, 18-65 years aged cases of Type 2 DM diagnosed by ADA criteria with BP less than 130/90 mm of Hg (at least 3 recordings with the highest recording taken into consideration) were taken. Out of which, cases with other diseases were excluded from study. Thus finaly 75 cases were taken in study group. Like wise age sex matched healthy controls were chosen from their attendent.

The diagnosis of diabetes will make on the basis of clinical evaluation, biochemical and ancillary investigation fasting plasma glucose (FPG)/postprandial plasma glucose (PPPG) and HbA1C according to recent American Diabetic Association (ADA) recommendations.

A detailed clinical history with specific reference to cardiovascular symptoms, drug intake and smoking was taken. A complete general and systemic examination was carried out. A normal resting electrocardiogram and chest radiograph were prerequisites for participation. Plasma glucose (fasting and post prandial) was measured by the glucose oxidase method and the urine sugar by Benedict's reagent. Biochemical investigations in the form of blood urea, serum creatinine and serum cholesterol were also carried out enzymatically. A standard 12 lead electrocardiogram and a transthoracic echocardiogram in all its modes (M, colour Doppler) were carried out.

All the subjects (all diabetic patients and healthy volunteers) were evaluated by transthoracic 2-D and Doppler Echocardiography to assess left ventricular diastolic function. Echocardiographer was not aware of this study to avoid bias in the interpretation. Measurements of the different cardiac chambers were made according to recommendation of the American Society of Cardiology. All examinations were performed using an ALOKA SSD 2000 machine 2.5MHz transducer.

Statistical analysis: Categorical data was expressed as proportion and difference in proportion was analyzed using Chi square test. Quantitative data was expressed as mean and standard deviation and the difference in mean between two groups was inferred using unpaired 't' test. Statistical significance was kept at $p<0.05$. All statistical analysis was done using Epi info version 7.2.1.0 software.

Results

The present study included 75 patients with type 2 Diabetes mellitus who fulfilled inclusion criteria and were admitted at the Mathura Das Mathur Hospital, attached to Dr. S.N. Medical College, Jodhpur. The data obtained from these cases formed the basis of our study.

Table 1 Age and Sex Distribution among Case population

Age	Case Distribution		
	F	M	Total
<50	5 (6.67%)	11 (14.67%)	16 (21.33%)
50-60	6 (8%)	22 (29.33%)	28 (37.33%)
>60	15 (20%)	16 (21.33%)	31 (41.33%)
	26 (34.67%)	49 (65.33%)	75 (100%)

The age distribution among case group (n=75) was : less than <50 years age group 16 out of 75 (21.33%), 50-60 years age group 28 out of 75 (37.33%), more than >60 years age group 31 out of 75 (41.33%).

Table 2: Relation of duration of Diabetes with LVDD

Variables		Left Ventricle diastolic dysfunction Present	Left Ventricle diastolic dysfunction Absent	Chi square	p value
Duration of diabetes Mellitus	<5 yr (31)	12 (38.70%)	19	13.16	0.001*
	5-10 yr (31)	22 (70.96%)	9		
	>10 yr (13)	12 (92.30%)	1		

*: statistically significant

The distribution of total cases (n=75) according to the duration of diabetes were as follows; 31 cases with <5 years duration, 31 cases with duration between 5-10 yrs and 13 cases with duration >10 years. LVDD was present in 12 (92.3%) out of 13 cases with duration of diabetes >10 yrs and the relation was statistically significant (p.001).

Table 3: Relation of Diabetic Retinopathy with LVDD

Variables		Left Ventricle diastolic dysfunction Present	Left Ventricle diastolic dysfunction Absent	Chi square	p value
Retinopathy present	18	16 (88.89%)	2	16.27	<0.01*

*: statistically significant

Out of 75 cases, 18 cases show retinopathy (24%).However the relation of retinopathy with LVDD was statistically significant (p value <0.01%) as 16 out of 18 (88.89%) cases with diabetic retinopathy showed LVDD.

Discussion

In the present study, 75 cases with type-2 DM and 75 healthy subjects as controls were included. Overall mean of obesity indices like BMI, WC and WHR were significantly higher in subjects with type 2 DM compared to the control group. Mean of FBS, HbA1c, Total Cholesterol, triglycerides and LDL cholesterol in case group was significantly higher as compared to the control group. The mean of HDL cholesterol was significantly lower in the case group as compared to the control group.

Out of 75 cases, 18 cases show retinopathy (24%).However the relation of retinopathy with LVDD was statistically significant (p value <0.01%) as 16 out of 18 (88.89%) cases with diabetic retinopathy showed LVDD in our study.

Cosson et al (2003) [5]Diabetic Retinopathy Studies performed in diabetic patients free of coronary artery disease have demonstrated that patients with mild to severe retinopathy exhibited LV diastolic dysfunction (lower E/A values) compared to age-matched controls or patients without retinopathy. In the most recent report, a higher prevalence of retinopathy (49%) was encountered in patients with abnormal mitral filling pattern (E/A ratio < 1) compared to patients with a normal diastolic function (20%).

Singhal P et al (2018)[6] was found that among cases, patients with and without DR, 15 (83.33%) and 17 (40.48%) had LVDD (<0.001).

Conclusion

The present study has shown that interaction of type 2 diabetics with left ventricular diastolic dysfunction. Older age, prolonged duration of Diabetes, high BMI, diabetic retinopathy, microalbuminuria, poorly controlled diabetes having higher prevalence of LVDD and thus this reflect as an indicator of early diabetic cardiomyopathy.

Early diagnosis and institution of treatment for LVDD in diabetic patients will reduce the morbidity and improve the outcomes by preventing future development of heart failure.

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