ORIGINAL RESEARCH PAPER

Medicine

A STUDY OF ECHOCARDIOGRAPHIC CHANGES IN ASYMPTOMATIC DIABETIC PATIENTS

KEY WORDS: Diabetes mellitus, Echocardiography, coronary artery disease

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ABSTRACT

Diabetes mellitus is a risk factor of coronary artery diseases. Non-invasive cardiovascular imaging offers an opportunity to detect the presence and severity of CAD. This study is done in view of screening the asymptomatic diabetic individuals presenting to our hospital for any evidence of early cardio-vascular manifestations. With the aid of non-invasive testing such as 2D ECHO the early changes were noted and compared with the normal population and the cardiac status thus evaluated. 106 patients (53 diabetic and 53 non-diabetic controls) were included in the study. The main objective of the study was to evaluate diabetic patients without overt symptoms of any cardiac disease for Echocardiographic changes. It was observed that majority among the diabetic population were found to have statistically significant changes in 2D ECHO including the presence of LV diastolic dysfunction and RWMA to be evident among the diabetic population.

INTRODUCTION

The importance of diabetes mellitus, both type 1 and type 2, in the epidemiology of cardiovascular diseases cannot be overemphasized. About one third of acute myocardial infarction patients have diabetes mellitus, the prevalence of which is steadily increasing. In the 1960s, there were 2 million Americans with diabetes mellitus; in the year 2000, their number was 15 million. (1) Statistics have shown that the decrease in cardiac mortality in persons with diabetes mellitus is lagging behind that of the general population. India is predicted to bear the greatest CAD burden, according to the estimates from the Global Burden of Disease Study.(2) Majority of the time the patient of Diabetes presents with complications like MI, heart failure, being end stages of cardiovascular disease associated with other macro and micro vascular complications.(3) If patients are screened at an early stage of Diabetes before the onset of symptoms the cardiovascular complications can be delayed and mortality can be reduced.(4) Fibrotic changes, especially in the basal area of the left ventricle, have frequently been observed in diabetic patients, even when cardiac involvement is clinically not yet evident This study is done in view of screening the asymptomatic diabetic individuals presenting to our hospital for any evidence of early cardio-vascular manifestations . With the aid of 2DECHO the early changes were noted and compared with the normal population and the cardiac status thus evaluated.

MATERIALS AND METHODS

SOURCE OF DATA

A total of 106 patients were included in the study. Out of them 53 were diabetic and 53 non-diabetic controls. 2D Echocardiogram was compared. Informed written consent was obtained from cases and controls for participation in the study and for conduction of investigations. The study was conducted between the period of June 2016 and January 2017.

STUDY DESIGN

Cross sectional comparative study

METHODOLOGY

Patients included in the study are those who were detected to be diabetic by ADA guidelines. Controls included are non-diabetic patients. Along with the routine blood investigations (CBC, RBS, RFT, LFT, SERUM ELECTROLYTES, HBA1C, FLP, TFT) a resting 12 lead ECG and 2D ECHO was also done.

SAMPLE SIZE

Using independent group T test, equal sample size was taken. Level of significance5%, power of 80 %, effect size of 0.55. The sample size calculated was 53 cases and 53 controls

INCLUSION CRITERIA

Patients of 18 years of age and above of either sex who are willing to participate in the study. Patients who have been diagnosed with diabetes by ADA guidelines.

EXCLUSION CRITERIA

Patients previously diagnosed to have other co-morbidities such as systemic hypertension or any coronary artery disease, valvular heart disease, heart failure or thyroid disorders. Patients with chronic illness such as chronic liver disease, chronic obstructive pulmonary disease, chronic kidney disease and malignancy.

BIOSAFETY ISSUES

– Not applicable

STATISTICAL ANALYSIS

Continuous variables are expressed in terms of mean and standard deviation and categorical variables presented in frequency and percentages. Independent t-test is used to compare all the continuous variables between the groups. Chi square test is used to find whether there is any association between two categorical variables. A p-value < 0.05 is considered significant. Data visualization is done using appropriate charts. All the analysis is done using SPSS version 22 software and Microsoft excel.

ETHICS

This study was conducted after ethical clearance from the Ethical committee of the University as per standard protocols and guidelines.

RESULT

The presence of LVH between the two groups. From chisquare test, we can say that there is significant association pertaining to the presence of LVH between the two groups with a p-value 0.012. Among the diabetic population of 53 patients, 6 patients (11.3%) had LVH while 47 patients (88.7%) had no evidence of LVH. Among the controls, none of the subjects had any evidence of LVH.

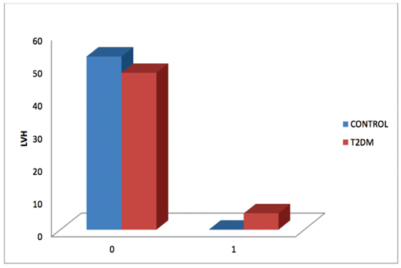

Figure 1: Comparison of LVH among study groups

EJECTION FRACTION we observed a significant difference between the groups with a p-value of 0.019. Ejection fraction was better in the Control group (M=60.00, SD=0.000) compared to the diabetic group (M=57.64, SD=7.179) with a mean difference of 2.358.

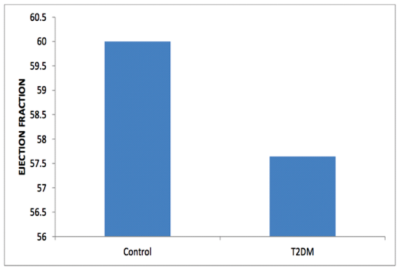

Figure 2: Comparison of ejection fraction among study groups

LEFT VENTRICULAR DIASTOLIC DYSFUNCTION in 2D Echo betwe en the two groups. From chi-square test, we can say that there is significant association pertaining to the presence of LVDD between the two groups with a p-value <0.001. Among the diabetic population of 53 patients, 35 patients (66%) had evidence of LVDD while 18 patients (34%) had no evidence of LVDD. Among the controls, none of the subjects had any evidence of LVDD.

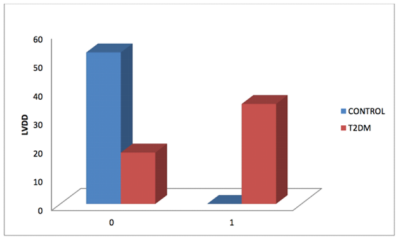

Figure 3: Comparison of LVDD among study groups

DISCUSSION

From our study, we observed a significant association pertaining to the presence of LVH between the two groups with a p-value of 0.012.Among the diabetic population of 53 patients, 6 patients (11.3%) had LVH while 47 patients (88.7%) had no evidence of LVH. Among the controls, none of the subjects had any evidence of LVH. The presence of LVH was confirmed on 2D Echocardiogram.

This finding was in accordance with multiple studies which showed the same. A study done by GomezMarcos et al (5) in 110 type 2 diabetic patients in the category of 20-80 years had the presence of left ventricular hypertrophy evidenced by the ECG manifestations of increased Cornell Voltage and increased QRS duration. A study done by Wiik et al (6) among 9193 diabetic patients showed presence of left ventricular hypertrophy as evidenced by increased Cornell Voltage and Sokolow Lyon voltage product. A study done by Barrios et al (7) among 276 diabetic patients showed left ventricular strain pattern as an early manifestation in patients with diabetes. Another study done by Okin et al (8) in 886 diabetic patients also showed the presence of left ventricular strain pattern as an early manifestation of diabetic heart disease. We compared the EJECTION FRACTION between the two groups and observed a significant difference between the groups with a p-value of 0.019. Ejection fraction was better in the Control group (M=60.00, SD=0.000) compared to the diabetic group (M=57.64, SD=7.179) with a mean difference of 2.358. Another observation was the presence of LEFT VENTRICULAR DIASTOLIC DYSFUNCTION in 2D Echo between the two groups. From chi-square test, we concluded that there was significant association pertaining to the presence of LVDD between the two groups with a p-value <0.001 Among the diabetic population of 53 patients, 35 patients (66%) had evidence of LVDD while 18 patients (34%) had evidence of LVDD. Among the controls, none of the subjects had any evidence of LVDD.

CONCLUSION

Presence of left ventricular hypertrophy was observed in the ECG among a few of the diabetic population and this finding was confirmed in the 2D Echocardiogram. Finally to conclude, our study shows significant changes in the ECG and 2D Echocardiogram of diabetic subjects in comparison to the normal population. This finding stresses on the importance of intensive management of the diabetic status as well as early diagnosis and management of concurrent hypertension

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