IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)
e-ISSN: 2279-0853, p-ISSN: 2279-0861.Volume 19, Issue 1 Ser.12 (January. 2020), PP 16-18
www.iosrjournals.org

Study of Echocardiographic Changes in Patients of Diabetic Nephropathy of Type 2 Diabetes Mellitus with Background Hypertension

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Abstract: *Excessive cardiovascular mortality is seen in patients of Diabetic nephropathy of Type 2 Diabetes with background hypertension. Echocardiography in recent years has become the gold standard in detecting structural changes in heart of these patients. As the prevalence of Type 2 Diabetes is increasing in India as well as in world, the objective of this study was to find out the prevalence of structural cardiovascular ailments in Type 2 Diabetic patients with nephropathy and background hypertension. This study will help clinicians with screening, diagnosis and timely intervention to reduce mortality and also in future and ongoing research. The study was conducted over 100 patients with Diabetic nephropathy of Type 2 Diabetes with background hypertension attending the outpatient and inpatient services of RIMS, Ranchi, India. The study was approved by the ethical committee of the institute. The study showed that 75% of the patients had Echocardiographic changes while 25% had normal Echocardiographic findings. Thus, cardiovascular assessment is must in Type 2 Diabetes mellitus patients with nephropathy and background hypertension.*

Keywords: *Echocardiography , Diabetic nephropathy , Type 2 Diabetes mellitus , Background hypertension*

Date of Submission: 08-01-2020 Date of Acceptance: 23-01-2020

I. Introduction

Diabetes mellitus is a clinical syndrome characterized by hyperglycemia due to absolute or relative insulin deficiency. The prevalence of both type of Diabetes varies considerably worldwide. Recent trends have shown that Type 2 Diabetes is a major burden in health care facilities in all countries and is now being observed in children and adolescents. Hyperglycemia represents an independent risk factor for development of microvascular and macrovascular diseases. If untreated, hyperglycemia is associated with significant risk of microvascular diseases like Diabetic nephropathy , retinopathy , neuropathy and to some extent dermatopathy. Diabetic nephropathy is a complication of Diabetes and is associated with increased cardiovascular mortality and decrease in quality of life. It is a major factor in development of chronic kidney disease and is the leading cause of End Stage Renal Disease. It is associated with development of other diabetes related complications. Type 2 Diabetes contributes about 99% of Diabetes in Indian population and only about 1% are Type 1. With increase of diabetic population in India and worldwide, it is obvious that incidence of diabetes related complications like nephropathy is going to be a formidable challenge to the medical fraternity. Cardiovascular causes are a major cause of mortality in Diabetic nephropathy. Echocardiography has become the gold standard investigation to detect any structural cardiac defects associated with Diabetes. Study of prevalence of various cardiovascular ailments in Diabetic nephropathy patients would help in proper and timely intervention and reducing the mortality in Diabetic nephropathy patients as well as helping in ongoing and future research.

II. Materials And Method

A conventional 2D Echocardiography was done and data collected over 100 patients attending outpatient and inpatient services in RIMS, Ranchi, India .The study was approved by the ethical committee of the institute. The study was carried between March 2016 and September 2017.The patients fulfilled the criteria of Diabetic nephropathy , Type 2 Diabetes mellitus and background hypertension.

Exclusion criteria

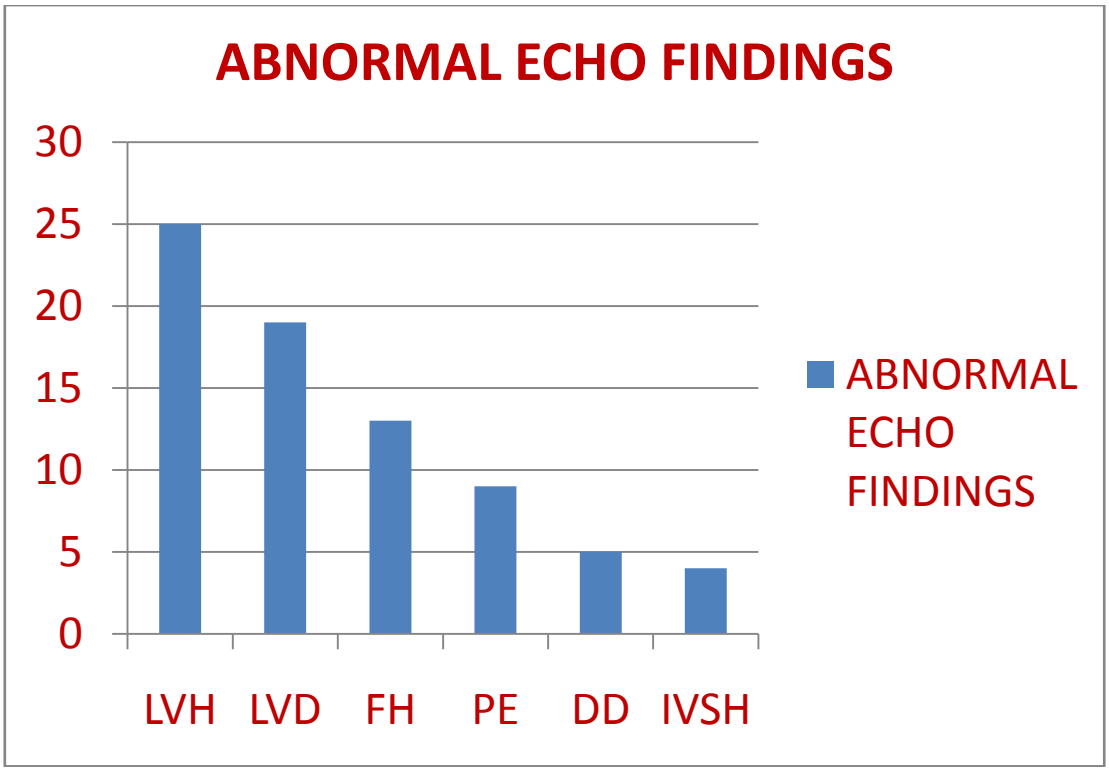
1. Type 1 Diabetes mellitus patients are excluded.
2. Patients without background hypertension(SBP >14Omm Hg and/or DBP >90 mm Hg) are excluded.
3. Patients with renal diseases without diabetes are excluded.

Limitation

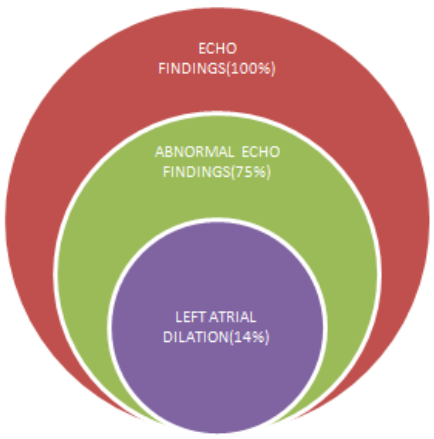
For conventional 2D Echocardiography machine -Inter/Intra observer variabilities, noise interference and angle dependence may interfere with accurate and precise findings.

III. Observation And Result

1. In the study conducted over 100 patients with Diabetic nephropathy and background hypertension in Type 2 Diabetes, 75% showed Echocardiographic changes.
2. Amongst these most common was Left ventricular hypertrophy (LVH – 25%) followed by Left ventricular dilation (LVD – 19%), Focal hypokinesia/akinesia (FH - 13%), Pericardial effusion (PE - 9%), Diastolic dysfunction (DD - 5%), Interventricular septal hypertrophy (IVSH - 4%).
3. 14% showed Left atrial dilation (LAD) which overlapped with the above findings.
4. 25% showed no Echocardiographic abnormality.



Graph showing prevalence of various abnormal Echocardiographic findings in Diabetic nephropathy patients of Type 2 Diabetes with background hypertension



Composite venn diagram showing prevalence of abnormal findings and overlapping of LAD in Echocardiographic study of the population under study

IV. Discussion

Hypertension can either be a cause or a consequence of renal disease or both. A complex relationship lies between blood pressure and renal disease. Formation of AGE'S (Advanced glycation end products) has led to Type 2 Diabetes Mellitus in even younger adults. Hypertension and Diabetic nephropathy both can lead to cardiovascular ailments. The renal hemodynamic abnormality is similar in both Type 1 and Type 2 Diabetes mellitus. An early physiological abnormality is glomerular hyperfiltration associated with intraglomerular hypertension. This is accompanied by microalbuminuria which is the first clinical sign of Diabetic nephropathy. Diabetic nephropathy is caused by both metabolic(hyperglycemia and hyperlipidemia) and hemodynamic (systemic and glomerular hypertension)alterations. Oxidative stress, inflammatory cytokines and endothelial dysfunction too plays a role. Oxidative stress consumes nitric oxide which prevents flow mediated dilation of blood vessels (endothelial dysfunction) subjecting the endothelium to injury. This leads to production of cytokines , acceleration of inflammation, worsening of blood vessel rigidity due to atherosclerosis and further impairment of flow mediated dilation and susceptibility to oxidative stress. Inflammation, endothelial dysfunction and oxidative stress forms a vicious cycle that leads to significant kidney damage and cardiovascular events.

V. Conclusion

The above findings suggest that cardiac assessment is must for evaluation of patients with Diabetic nephropathy in Type 2 Diabetes mellitus. The present study again lays emphasis on cardiac assessment for early intervention and decreasing the mortality in patients with Diabetic nephropathy and background hypertension in Type 2 Diabetes mellitus patients.

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Dr. Ravish Kumar Sinha, et.al. "Study of Echocardiographic Changes in Patients of Diabetic Nephropathy of Type 2 Diabetes Mellitus with Background Hypertension". *IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)*, 19(1), 2020, pp. 16-18.