



MICROALBUMINURIA AND CAROTID INTIMA MEDIA THICKNESS AS PREDICTORS OF LEFT VENTRICULAR FUNCTION IN DIABETIC PATIENTS AS ASSESSED BY MYOCARDIAL PERFORMANCE INDEX

Cardiology

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ABSTRACT

Background- Diabetes mellitus promotes deleterious changes in the coronary microvasculature. Left ventricular structural abnormalities, abnormal filling pressures and impaired relaxation occurs in the early stages of diabetes mellitus. Myocardial performance index has been suggested as a non invasive and reproducible method for better evaluation of global lv function. Microalbuminuria has been identified as the earliest sign of diabetic nephropathy. Albuminuria is now considered as a significant predictor of cardiovascular morbidity and mortality in patients with diabetes mellitus. Carotid intima media thickness is used commonly as a noninvasive test for the assessment of degree of atherosclerosis. **Methods-** This is a prospective observational study done in diabetic patients attending cardiology OPD in chengalpattu medical college. The study done in 275 diabetic patients over a period of 6 months. Microalbuminuria detected by Albumin creatinine ratio and carotid intima media thickness assessed by ultrasound vascular probe. Both parameters were compared and correlated with left ventricular MPI. **Results-** Among 275 patients; 147 were males and 128 were females. Mean duration of diabetes was found to be 8 years. LV MPI was increased in 96 patients (35%) and MPI values were normal in 179 patients (65%). 161 patients (58%) had microalbuminuria. Among 96 patients with increased MPI values, microalbuminuria was significantly elevated, hence had a sensitivity of 85.4% and specificity of 55.8%. CIMT was found to be abnormal in 71 patients (25%). Similarly, CIMT was 54% sensitive and 89% specific when correlated with LV dysfunction. When both microalbuminuria and CIMT tests were combined, the sensitivity rose to 93% and but specificity remained at 48%. **Conclusion-** Microalbuminuria was found to have higher sensitivity and CIMT had higher specificity. When both tests were done, the combination had significantly higher sensitivity (93%). Hence when both these tests are combined in diabetic patients, we can identify the LV dysfunction with considerable sensitivity.

KEYWORDS

MPI - Myocardial performance index, CIMT – Carotid intima media thickness.

INTRODUCTION

Diabetes mellitus (DM) promotes deleterious changes in the coronary microvasculature, leading to overproduction of extracellular matrix proteins and thickening of capillary basement membranes. Such unfavorable alterations are regarded as landmarks of the microvascular complications of DM. Microalbuminuria has been identified as the earliest sign of diabetic nephropathy. The prevalence of microalbuminuria is reported to be 15- 22% in diabetic patients. Albuminuria is now considered as a significant predictor of cardiovascular morbidity and mortality in patients with DM. Left ventricular (LV) structural abnormalities such as concentric remodeling or hypertrophy, abnormal filling pressures, as well as impaired relaxation, may thus develop in the early stages of DM, in the absence of coronary artery disease (CAD). In this respect, the LV myocardial performance index, or Tei index, has been suggested as a non-invasive and reproducible method for evaluating both systolic and diastolic LV functions. It may thus provide a better evaluation of global LV function than other isolated measures of the LV ejection or relaxation. This index is additionally a robust predictor of all-cause mortality, especially from cardiovascular diseases. Carotid intima media thickness is used commonly as a noninvasive test for the assessment of degree of atherosclerosis. Compared to healthy controls, CIMT was increased in individuals with diabetes by 0.13mm. This study aimed to assess LV function among diabetic patients using Myocardial performance index in relation to microalbuminuria and CIMT validate them individually and in combination.

MATERIALS AND METHODS

This is a prospective observational study done in diabetic patients attending cardiology OPD in chengalpattu medical college. The study done in 275 diabetic patients over a period of 6 months (March 2024 to August 2024).

Inclusion Criteria

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Diabetic Patients without prior cardiovascular disease referred for cardiac evaluation to Cardiology department

Exclusion Criteria

Patients with a history of angina pectoris, signs or symptoms of heart failure (HF), LVEF < 55%, Significant CAD, Valvular heart disease, Arrhythmias, Cardiomyopathy, Urinary tract infection, Macroalbuminuria

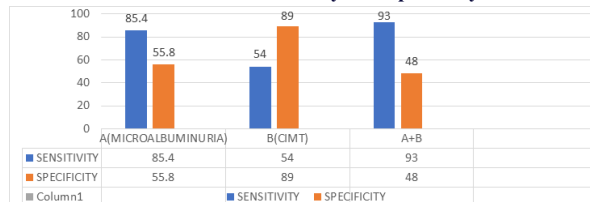
The carotid arteries were interrogated with a linear-array transducer operating at a fundamental frequency of 7MHz. As per the consensus statement from the American Society of Echocardiography Carotid Intima-Media Thickness Task Force, only Distal 1 cm of the far wall of each Common Carotid Artery (CCA) was obtained. After optimizing the image, a cine-loop with 3–5 beats was stored. The CCA was then imaged from two additional complimentary angles, approximately 45° anterior and posterior to the first image. A cine loop was stored for each view on the right and left sides. The average of the six values was taken as the mean CIMT. Longitudinal Plaque screen scans (3-5 beat cine loop from at least three different angles in each segment) at near and far walls of CCA, Bulb and Internal carotid artery segments were also done according to the task force recommendation. The presence of carotid plaque or CIMT greater than or equal to the 75th percentile for the patient's age, sex, and race/ethnicity are indicative of increased CVD risk and are considered high. In these patients, urinary albumin level measured by Albumin creatinine ratio from the spot urine sample. Myocardial performance index calculated from isovolumic relaxation time, isovolumic contraction time and ejection time by using Mindray echocardiography machine with a 2.5-Megta Hz probe. A single observer did CIMT and Microalbuminuria measurements to eliminate bias, and these two tests were done in parallel. These both parameters were compared and correlated with left ventricular MPI.

RESULTS

Among 275 patients; 147 were males and 128 were females. Mean age was 54 ± 9.8 years.

Mean duration of diabetes was found to be 8 years. LV MPI was increased in 96 patients (35%) and MPI values were normal in 179 patients (65%). 161 patients (58%) had microalbuminuria. Among 96 patients with increased MPI values, microalbuminuria was significantly elevated, hence had a sensitivity of 85.4% and specificity of 55.8%. CIMT was found to be abnormal in 71 patients (25%). Similarly, CIMT was 54% sensitive and 89% specific when correlated with LV dysfunction. When both microalbuminuria and CIMT tests were combined, the sensitivity rose to 93% and but specificity remained at 48%.

Individual And Combined Sensitivity And Specificity %



DISCUSSION

The present study was conducted to find the usefulness of Microalbuminuria and CIMT for early detection of LV dysfunction in diabetic patients. Our patients in the study were predominantly from the age group of 40-60 years. The number of male patients were slightly increased compared to female patients. LV MPI used for assess the global LV function. In this study LV MPI was increased in 35% of diabetic patients. In previous studies, the presence microalbuminuria is predictor of CVS events. Microalbuminuria was detected in 58% of diabetic patients. When microalbuminuria correlated with LV dysfunction, it has higher sensitivity but low specificity. Atherosclerosis is thought to have a similar progression in the coronary, cerebral and carotid arteries. CIMT is used to early identification of the cardiovascular risk in diabetic patients. CIMT was found to be abnormal in 25% of diabetic patients. When CIMT was correlated with LV dysfunction, it has higher specificity but low sensitivity. When these two tests were combined and correlated with LV dysfunction, it has high sensitivity.

CONCLUSION

MPI values was found to be significantly raised in patients with diabetes. Patients with microalbuminuria had statistically significant values of raised MPI values than patients without microalbuminuria. Microalbuminuria was found to have higher sensitivity and CIMT had higher specificity. When both tests were done, the combination had significantly higher sensitivity (93%). Hence when both these tests are combined in diabetic patients, we can identify the LV dysfunction with considerable sensitivity.

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