Section: Physiology

Original Research Article

ASSESSING LEFT VENTRICULAR RELAXATION ABNORMALITIES IN PRE-HYPERTENSIVE PATIENTS USING EARLY FILLING VS LATE FILLING OF LEFT VENTRICLE RATIO (E/A RATIO) OF ECHOCARDIOGRAM

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Abstract

Hypertension is one of the risk factors for cardiovascular diseases. Prehypertension is a predictor of hypertension and is associated with cardiovascular relaxation function abnormalities. Cardiovascular relaxation function can be studied by Non-invasive imaging methods like pulse wave Doppler echocardiography. We studied the left ventricular relaxation function in pre-hypertensive patients between the age group of 18-35 years E/A ratio using trans-mitral Doppler echocardiography. E/A ratio was significantly decreased (p=0.05), in the pre-hypertensive patients when compared to normotensive patients. This implies that pre-hypertensive are prone for left ventricular diastolic function abnormality compared to normotensive. Lifestyle modification in individuals with pre-hypertension can reduce the incidence of hypertension and thereby its cardiovascular complications.

INTRODUCTION

Aim and Objective

To Assess the Left Ventricular Relaxation Abnormalities in Pre-hypertensive patients using E/A ratio of echocardiogram.

MATERIALS AND METHODS

This study was conducted in a tertiary care center.100 subjects between 18 to 35 years of age of both gender were recruited from outpatient Medicine Department and Master Health Check-up of our institution. Among them 50 subjects were cases of (prehypertensive) and 50 were controls (normotensives). All the subjects underwent routine clinical examination to rule out the presence of any acute or chronic illness. It was ensured that all the subjects were healthy and physically fit to be included in the study. Eligible participants were explained about the nature of investigations to be conducted in the study. Informed written consent was obtained from all of them prior to the recordings. Subjects were classified into two groups based on their level of systolic and diastolic blood pressure as per JNC-VII Newer classification for hypertension.

All subjects were provided with a proforma sheet. Age, gender, anthropometric measurements, occupation, personal history were collected. Blood pressure recordings were done. Subjects were asked to rest in supine position for about 5-10 minutes in a quiet, calm examination room. Based on accuracy and reliability blood pressure was measured using standard mercury sphygmomanometer. To study left ventricle diastolic function a non- invasive Doppler echocardiographic technique is used. Echocardiography was performed using iE Philips Sonos system with the subject lying down in left lateral decubitus position with left arm under the head. Transmitral pulsed wave Doppler flow velocities were recorded within the apical 4- chamber or apical long axis view to determine the left ventricular filling hemodynamic. The Doppler cursor was placed parallel to mitral inflow and maximum velocity measured with the sample volume at the mitral valve leaflet tips. The mitral peak E (early filling) and A (inflow with atrial contraction) waves were measured offline and an E/A ratio was calculated.

Inclusion Criteria

Subjects between the age group of 18 to 35 years. Subjects were grouped as per JNC VII Newer classification for hypertension. Normotensive individuals with systolic BP 100-119mmHg and diastolic BP 60-79 mmHg. Prehypertensive individuals with systolic BP 120-139mmHg and diastolic BP 80-89 mm Hg.

Exclusion Criteria

Known case of hypertensive. Secondary hypertension including chronic kidney disease,

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hypertensive with target organ damage. History of coronary artery disease, congestive heart failure, cardiomyopathies, diabetes and pregnancy. Use of anti-hypertensive, steroids or cardio active medications.

Statistical Analysis

Statistical analysis was carried out using SPSS version 16.0. The baseline characteristics of the study population to the baseline blood pressure was investigated using the students t-test and chi-square (x2) test. For parametric data, the level of significance between normotensive and prehypertensive groups was tested by unpaired students t-test. To find out whether the independent factors like age, gender, BMI, occupation, smoking and alcoholism have an effect on to left ventricular relaxation function abnormality (E/A ratio) multiple regression analysis was used. A p-value <0.05 was considered significant.

RESULTS

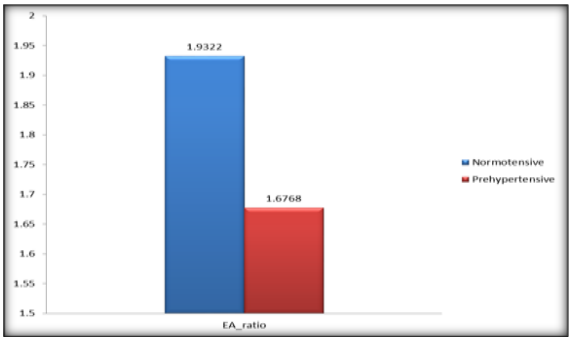

Figure 1: Comparison of E/A ratio between Normotensives and prehypertensive 18- 25 years of age.

Figure shows that the normotensive had a E/A ratio of 1.9322 ± 0.6769 and prehypertensive 1.6768 ± 0.5782. Here t -2.028; p-value 0.045. It was observed that E/A ratio showed a significant difference between the two group with a p- value of 0.045 (<0.05).

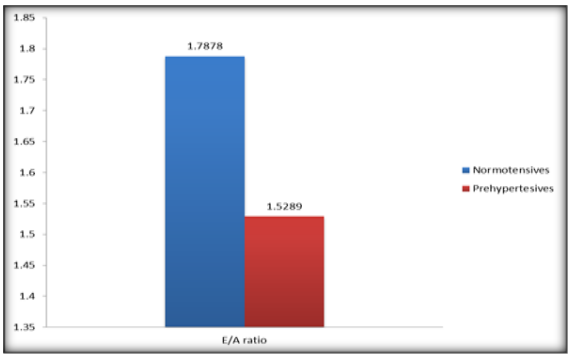

Figure 2: Comparison of E/A ratio between Normotensives and prehypertensive 25-35 years of age.

Figure shows that the normotensive had a E/A ratio 1.7878 ± 0.4493 of and prehypertensives was 1.5289 ± 0.4033. Here t -2.3274; p-value 0.0234. It was observed that E/A ratio showed a significant difference between the two group with a p- value of 0.0234 (<0.05).

DISCUSSION

Prehypertension is a risk factor for developing hypertension and is associated with subclinical cardiovascular disease. The present study was undertaken to compare the left ventricular relaxation function of young normotensive and prehypertensive adults. Transmitral pulsed wave Doppler flow velocity pattern was used to estimate left ventricular diastolic function. Our study demonstrated significant left ventricular relaxation function abnormalities in prehypertensive adults. When left ventricular wall becomes stiff, the back pressure increases, this slows the early (E) filling velocity, thus lowering E/A ratio. It was noted that there was a reduction in E/A ratio among the prehypertensive.

CONCLUSION

This study evaluated left ventricular diastolic relaxation function in young prehypertensive. Left ventricular diastolic function was more significantly impaired in the prehypertensive group than in the control group. This helps in early identification of diastolic relaxation abnormalities among prehypertensive and helps in prevention of cardiovascular complications. Further studies are required to confirm the benefits of lifestyle modifications and therapeutic interventions in young prehypertensive subjects.

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