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RESEARCH ARTICLE

ASSOCIATION OF LEFT VENTRICULAR MASS TO BLOOD PRESSURE

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ABSTRACT

Left ventricular hypertrophy (LVH), or increased LV mass, is a risk factor for cardiovascular diseases. Echocardiographic LVH is associated with cardiovascular morbidity and mortality. Knowledge of the left ventricular geometric patterns in normal population may have some prognostic significance. 200 healthy young adults of either sex in the age group of 18-22 were recruited for the study. All subjects were clinically evaluated and an echocardiographic examination was performed. Study showed a increased in left ventricular mass with increase diastolic and systolic pressure. Early diagnosis and aggressive treatment to control blood pressure should be taken with all seriousness.

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INTRODUCTION

Left ventricular myocardium has to support the systemic circulation. For this reason it has to undergo changes to adapt to varying conditions to which the entire circulatory system gets exposed. These changes occur in form of myocardial hypertrophy. And when the muscles undergo hypertrophy automatically ventricular mass also increases. Blood pressure is considered the most important haemodynamic factor in the development and progression of left ventricular hypertrophy (Levy *et al*., 1988). Increased left ventricular (LV) mass is an independent risk factor for cardiovascular diseases (Muhammad Sani Isa *et al*., 2010). Therefore this study was undertaken to analyse the association of left ventricuar mass with the of bood pressure in young aduts.

MATERIALS AND METHODS

In this cross sectional study 200 healthy young adults of either sex in the age group of 18-22 years were selected from the general population of Dibrugarh randomly. The ethical committee clearance and an informed consent of the subjects were taken. Subjects less than 18 years and more than 22 years and individual with overt cardiovascular disease, respiratory disease, electrolyte abnormalities, renal failure, smoker, hypertension, diabetes mellitus and with other serious co-morbid conditions, obese individual or trained athletes or on medication which can affect B.P and not consenting for Echocardiography were excluded from the study. Anthropometric parameters like height (in cm), weight (in Kg) were recorded and body mass index (BMI) was derived by Quetelet's index.

BMI=weight (kg)/height (m2)

Blood pressure was recorded in the right upper arm after the subject had rested for at least 5 minutes with standard mercury sphygmomanometer to the nearest 2 mm Hg as per the guidelines of sixth report of the joint national committee on detection, evaluation and treatment of high blood pressure. (Joint national committee on detection, 1997) M-mode Echocardiography was performed in each subject. All the measurements were made at the end of diastole using the American society of Echocardiography (ASE) standard criteria (Sahn *et al*., 1978) as well as Penn convention (Devereux and Reichek, 1977). Left ventricular mass was calculated using the formula as proposed by devereux *et al*. (1977).

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LV mass (g) =1.04 [(IVSd + LVIDd + LVPWTd) 3 - (LVIDd) 3]} -13.6

Where:-

IVSd -interventricular septum-diastolic dimension
LVIDd –Left Ventricular internal diameter
LVPWTd - Left Ventricular Posterior wall dimension

RESULTS AND OBSERVATION

A total of 200 healthy subject of either sex comprising 140 males and 60 females were studied. The sex distribution of the participant is shown in Figure 1. The study population was categorized into 3 groups according to level of diastolic pressure as shown in Table 1. On the basis of systolic pressure the study population was divided into 3 groups as shown in Table 2. The comparative value of left ventricular mass between male and females is shown in Table 3. Mean left ventricular mass in males is significantly higher than females. The mean±SD values of left ventricular mass in different groups of diastolic pressure is shown in table 4. It is seen that the left ventricular mass values showed a progressive increased with increase in diastolic pressure. On comparison between groupA vs groupB and group A vs group C a rise was observed which was statistically significant. On comparision between group B vs group C a increase was noted which was statistically non significant. The mean±SD values of left ventricular mass in different groups of Systolic pressure is shown in Table 5. The mean±SD values of left ventricular mass showed a progressive increase with increase in systolic pressure.

Table 1. The distribution according to diastolic pressure

Groups	Diastolic pressure(mmHg)	Number	Percentage
A	≤70	74	37%
B	71-80	89	44.5%
C	>80	37	18.5%

Table 2. The distribution according to systolic pressure

Group	Systolic pressure(mmHg)	Number	Percentage
A	≤110	68	39%
B	111-130	116	58%
C	>130	16	8%

Table 3. The comparative value of left ventricular mass between male and females

Sex	LV mass(mean±SD)	p-value
Male	119.71±14.85	
Female	104.4±13.85	<0.001

Table 4. The mean±SD values of left ventricular mass in different groups of diastolic pressure

DBP group	LV mass (mean±SD)
A	108.39±33.26
B	117.65±16.5
C	124.86±20.04

Table 5. The mean±SD values of left ventricular mass in different groups of systolic pressure

SBP group	LV mass (mean±SD)
A	107.68±15.3
B	118.69±14.29
C	126.75±10.14

Table 6. The Comparison of left ventricular mass in Different Groups of diastolic pressure and systolic pressure

Parameter	Groups	P-value	Significance
Diastolic pressure	Gr A vs Gr B	<0.05	S
	Gr A vs Gr C	<0.001	S
	Gr B vs Gr C	>0.05	NS
Systolic pressure	Gr A vs Gr B	<0.001	S
	Gr A vs Gr C	<0.001	S
	Gr B vs Gr C	<0.001	S

p value > 0.05 was non-significant (NS);p value < 0.05 was significant(S)

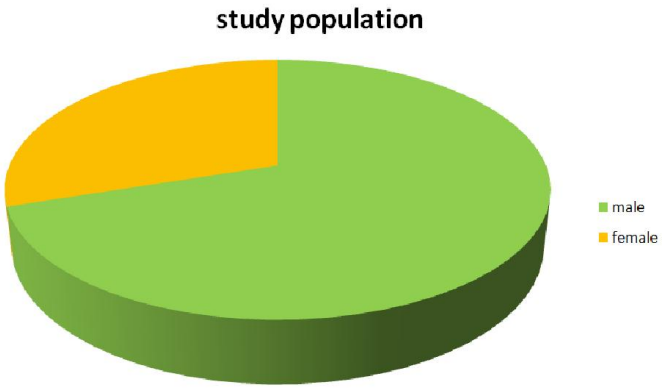

Figure 1. Sex distribution of the study group

On comparison between groupA vs groupB, group A vs group C and group B vs group C a rise was observed which was statistically significant

DISCUSSION

The present study showed a increased in left ventricular mass with increase diastolic and systolic pressure. This finding was inconsistent with the findings of Koren *et al.* (1991), Maheswari *et al.* (2000) and Deverex *et al.* (1986). Increased blood pressure causes cardiac remodelling. Left ventricular (LV) hypertrophy, which is defined as an abnormal increase in LV mass, is one of the organic processes resulting from hypertension. Increase systolic pressure increases left ventricular wall stress leading to left ventricular hypertrophy. increased left ventricular mass may result not only from cell hypertrophy but also from increases in collagen, which may provide a substrate for malignant arrhythmias and sudden death.

Conclusion

Left ventricular hypertrophy is an independent risk factor for myocardial infarction and death in men and women with hypertension (Casale *et al.*, 1986; Koren *et al.*, 1991) and in asymptomatic subjects with normal blood. (Levy *et al.*, 1989; Levy *et al.*, 1990) Given the prognostic importance of left

ventricular hypertrophy it seems appropriate to look for it in every person at risk

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