Material & Methods
Selection of Cases

In the present study, thirty hypertensive patients of both sexes and age ranging between 31 to 68 years, were selected, who either attended the out patient department or were admitted to the indoor wards of M.L.B. Medical College Hospital.

Fifteen control cases were also studied to standardize the various echocardiographic parameters of left ventricular function. These cases were selected from healthy, normotensive attendants of patients.

Criteria for Selection

Study group – 30 cases of hypertension

All patients of systemic hypertension whose diastolic blood pressure was persistently over 90 mm Hg, were selected for the study.

But hypertensive patients with coexistent ischemic heart disease, congenital and acquired heart disease, cor pulmonale, pregnancy with or without toxemia, hyperdynamic circulatory states, chronic renal failure and cardiomyopathies were excluded, as these on their own accord, are likely to alter the function of the heart.

Normal Healthy Controls

Fifteen normal healthy individuals of both sexes were studied after careful screening to exclude hypertension or
any other ailment by proper history, clinical examination and investigation.

**Methods**

The study was done along following lines after informed consent was taken:-

**Clinical history and examination** – All cases were subjected to detailed clinical history and through physical examination

**Investigations** – All cases taken up in this study were subjected to following investigations –

*(a). Routine*

Complete haemogram

Complete urine analysis

Blood sugar – fasting and post prandial

Serum creatinine, Blood urea

Serum Na⁺ / K⁺

*(b). Specific*

X-ray chest

E.C.G.

*(c). Special*

Echocardiography

**Chest X-ray**

The cases under study were radiologically evaluated for evidence of any cardiac involvement. For this purpose posterioroanterior and lateral views of chest were taken. The structural cardiac alteration consequent upon hypertension, which could be detected by X-ray and taken into consideration was left ventricular enlargement.
A 12 lead electrocardiogram was recorded in all the patients and L.V.H. was considered to exist if, either the probable or the definite criteria of Este’s scoring method for LVH was satisfied.

**Echocardiography M-Mode, 2 dimensional & Doppler**

Cross sectional echocardiography was performed at M.L.B. Medical College Hospital, Medicine department, using Hewlett Packard Ultrasound imaging system, using 3.5 / 2.5 megahertz phase array transducer.

Echocardiography was performed from right side of the patients. To maintain airless contact between transducer and skin, a liquid coupling medium (glycol based or water based) was applied over area of the skin to be scanned.

Patients were examined in supine and left lateral positions and the heart was visualized with multiple transducer positions using all 3 basic echocardiographic windows namely:-

1. Para sternal
2. Apical
3. Subcostal

**(a). Parasternal views**

1. **Parasternal long axis views**

   It is parallel to plane extending from the right shoulder to left hip. This views allows 2–D examination of the size and shape of left ventricle, right ventricular outflow tract, left atrium and aortic root, as well as examination of mitral and aortic valve.
ventricle tricuspid valve and right atrium.

2. Parasternal short axis view:

This is obtained by rotating transducer through 90° clockwise, from long axis of the heart, parallel to the plane extending from the left shoulder towards right hip.

Examination is done with transducer in 3rd and 2nd interspace pointing directly posteriorly to visualize papillary muscles. Then the transducer is tilted slightly cephalad, to image size of left ventricle during systole and diastole as well as fish mouth appearance of mitral valve.

(b). Apical view

1. Apical four chamber view

This was taken by turning patients to a steeper left lateral position. This view display all 4 cardiac chambers, permits evaluation of ventricular and atrial septa and anterior & posterior leaflets of mitral valve.

2. Five chamber (including aortic outflow)

Beam is angled more anteriorly towards chest wall, 5th chamber is not a chamber but is the aortic valve and ascending aorta.

3. Apical Long Axis view

This is obtained by rotating the transducer 90° counter clockwise. This view allows visualization of the ventricular septum and is particularly useful for Doppler examination and to show different segment of left ventricle.
It is taken with patient lying supine with knees flexed. Transducer is placed in upper epigastrium, pressed firmly back and directed towards patient's head with little posterior and leftwards tilt. This view provides diagnostic yield in patients with chronic pulmonary disease and hyperinflation of lungs and low diaphragm usually precludes examination of the precordial and apical windows. The subcostal four chamber view is particularly helpful in examining the interatrial and interventricular septum.

The dimensions of the left ventricle and thickness of both the interventricular septum and posterior wall were made at the level of the chordae tendinae in either the parasternal long axis or short axis views.

The left ventricular echocardiographic measurements were made from the endocardial echo of the posterior wall to the endocardial echo of the left side of the interventricular septum. Measurements at end-diastole (LVIDd) were made. The parameters considered for diastolic function were –EF slope, E, A, E/A, for systolic function-LVIDd, LVIDs, EF (ejection fraction). Statistical evaluation of the results were done.