Material & Methods
MATERIAL AND METHODS

Patients of systemic hypertension were taken from Medical OPD or cardiac/Hypertension clinic.

METHODS

Patient's age, sex, occupational history, History of alcohol intake, smoking, tobacco, gutka chewing and other diversity habits. History of diabetes, obesity, angina, dyspnoea, headache, myocardial infarction, weight loss, hematuria, drug history other relevant history will be taken patient's family history of hypertension, CAD, DM, obesity was taken.

Patient's complete examination was followed by routine investigations e.g. blood sugar, blood urea, serum creatinine, Hb, CBC, urine routine and microscopy, X-ray chest, 12 lead ECG and lipid profile.

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

But hypertensive patients with coexistent ischemic heart disease, congenital and acquired heart disease, cor pulmonale, pregnancy with toxaemia, 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.

**METHODS**

All the selected patient's were subjected to :-

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

*Investigations* – All cases in this study were subjected to the following investigations.

1. Blood - Complete Hemogram
2. Urine - Routine and microscopic examination 24hr urinary protein
3. ECG - Standard 12 lead ECG
4. X-ray chest - PA view
5. Fundus examination

**Specialized investigation**

1. Blood sugar - Fasting Post prandial
2. Blood urea
3. Serum creatinine
4. Serum electrolytes (Na⁺, K⁺)

5. Lipid profile: Total cholesterol, LDL, HDL, triglyceride (12-14 hours fasting)

6. Abdominal ultrasonography

7. Echocardiography

   All selected patients will be subjected to echocardiography.

   The left ventricular dysfunction was assessed in the following heading –

   1) LVH

   2) Diastolic dysfunction

   3) Systolic dysfunction

LVH: There are two methods of calculating LV mass from 2D echocardiography.

   a) Area length method

   b) Truncated ellipsoid method

   For both methods require short axis view of left ventricle at papillary muscle level and apical four or two chamber at end
diastole are required. Myocardial mass is equal to product of volume and specific gravity of myocardium (1.04 gm/ml).

Built in software in ultrasound can make both methods available so that mass is automatically calculated, once all variables are fed. LV mass can also be estimated from 2D guided, M mode measurements of LV dimension and wall thickness at papillary muscle level without measuring left ventricular major axis. Dimension and simple geometric cube formula. The following equation provides an accurate determination of LV mass, according to Devereux and associated –

Left ventricular mass (gms)

\[ = 1.04 \times (\text{LVID} + \text{PWT} + \text{IVST})^3 - \text{LVID}^3 \times 0.8 + 0.6 \]

where

1.04 specific gravity of myocardium

0.8 correction factor

LVID – Left ventricular internal dimension

PWT – Posterior wall thickness

IVST – Interventricular sept. thickness measured at end diastole
Diastolic dysfunction

Based on Doppler velocity pattern, diastole dysfunction is divided into three categories –

a) Relaxation abnormalities

b) Restrictive physiology

c) Pseudonormalization

Relaxation abnormalities

Abnormal myocardial relaxation characterized by constellation of following abnormalities

Prolonged IVRT (Isovolumic relaxation time) > 110 m/sec

Low E velocity (early filling velocity) and high

A velocity (A velocity = Late filling velocity)

Revised E/A ratio (<1.0)

Prolonged deceleration time (DT) > 240 m/sec

Restrictive physiology: is characterized by following diastolic parameters

Shortened IVRT (<60 msec)

High E velocity and low velocity
Increased E/A ratio > 2

Shortened deceleration time (< 150 msec)

**Systolic dysfunction**

To evaluate systolic two parameters are used:

1) Fractional shortening or ejection fraction

2) Cardiac output

**Fractional shortening**: is a percentage change in left ventricle cavity dimension with systolic contraction and can be calculated from following equation.

\[
\text{Fractional shortening} = \frac{\text{LVED - LVES}}{\text{LVED}} \times 100\%
\]

Where

- \( \text{LVES} \) – LV end systolic dimension
- \( \text{LVED} \) – LV end diastolic dimension

**Ejection fraction**: Represents stroke volume as percent of end diastolic left ventricular volume.

\[
\text{Ejection fraction} = \frac{\text{EDV} - \text{ESV}}{\text{E}} \times 100\%
\]

Where

- \( \text{EDV} \) - End diastolic volume of LV
ESV - End systolic volume of LV

Quninomers and co authors proposed a simplified method for determination of ejection fraction by measuring LV internal dimensions

\[
\text{Ejection fraction} = (\% \triangle D^2) + [C1 - \% \triangle D^2][\% \triangle L]
\]

Where

\[
\% \triangle D^2 = \left[\frac{(LVED - LVES)}{LVED^2}\right] \times 100\%
\]