MATERIAL & METHODS
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MATERIAL:

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

Patient’s name, age, sex, occupational history. H/o alcohol intake, smoking, tobacco/Gutka chewing and other dietary habits H/o diabetes, obesity, myocardial infarction, weight loss hematuria, drugs history and other relevant history will be taken. Patient’s family history of hypertension, CAD, diabetes mellitus, obesity etc. will also be taken.

Patient’s complete examination will be done followed by routine investigations eg. blood sugar, blood urea, s. creatinine, Hb, CBC, urine routine and microscopy, x-ray chest, 12 lead ECG and lipid profile.

Only those hypertensive patients will be included in study

(1) Who are not taking any anti-hypertensive agent for last 3 months,

2) And have no other cardiac co-morbidities,

3) and on initial echocardiography have some degree of left ventricular dysfunction in form of diastolic, systolic dysfunction or both or left ventricular hypertrophy.
These patients will be assessed in two groups after matching for known confounding factors like age, sex & socio-economic class etc.

Randomization will be done by simply using WHO series of random member.

**Method**

These patients will be subjected to echocardiography at two stages, first at beginning of study and second at end of 3 months of antihypertensive treatments.

The left ventricular dysfunction will be asserted in following heading –

1) LVH
2) Diastolic dysfunction
3) Systolic dysfunction

LVH: There are two methods of calculating LV mass from 2-D 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 view at end diastole are required. Myocardial mass is equal to product of volume and specific gravity of myocardium (1.04gm/ml). Built-in software in
ultrasound unit can make both methods available so that mass is automatically calculated once all variables are fed. LV mass can also be estimated from 2-D guided, M mode measurement of LV dimension and wall thickness at papillary muscle level without measuring left ventricular major axis. Left ventricular mass is reliably obtained from left ventricular short axis dimension and simple geometric cube formula. The following equation provides an accurate determination of LV mass, according to Devereux & associated.

\[ \text{Left ventricular mass (gms)} = \]

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

where :

1.04 specific gravity of myocardium

0.8 – correction factor

LVID – Left ventricle internal dimension

PWT – Posterior wall thickness

IVST – Interventricular septal thickness measured at end diastole.

**Diastolic dysfunction**

Based on Doppler velocity pattern, diastolic dysfunction is divided into three categories-

a) Relaxation abnormalities

b) Restrictive physiology

c) Pseudonormalization
a) Relaxation abnormalities: Abnormal myocardial relaxation is characterized by a constellation of following abnormalities:

1) Prolonged IVRT (Isovolumic relaxation time) >110msec.

2) Low E velocity (early filling velocity) and high A velocity (A velocity = late filling velocity).

3) Revised E/A ratio (<1.0)

4) Prolonged deceleration time (DT) >240msec.

b) Restrictive physiology: Is characterized by following diastolic parameters:

i) Shortened IVRT (<60msec)

ii) High E velocity and low A velocity

iii) Increased E/A ratio >2.

iv) Shortened deceleration time (<150msec).

**Systolic dysfunction**

To evaluate systolic function two parameters are used:

1) Fractional shortening or ejection fraction.

2) Cardiac output

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

\[
\text{Fractional shortening} = \frac{(\text{LVED}-\text{LVES})}{\text{LVED}} \times 100\%
\]
LVES - LV end systolic dimension
LVED – LV end diastolic dimension

fraction : Represents stroke volume as a percent
diastolic left ventricular volume-

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

EDV- End diastolic volume of LV
ESV- End diastolic volume of LV

and co-authors proposed a simplified method for
ejection fraction by measuring left ventricle

\[ \text{IF} = \left( \%OD^2 \right) + \left( 1 - \%OD^2 \right) \times \%DL \]

Whereas - \( \%OD^2 = \left( \frac{(LVED - LVES)}{LVED} \right) \times 100\% \)