



RESEARCH ARTICLE

STUDY OF LEFT VENTRICLE MASS AT THE TIME OF DIAGNOSIS IN HYPERTENSIVE PATIENTS

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Abstract

Background: Hypertension is a significant public health issue that affects people all over the world. In India, hypertension affects 5-15 percent of the adult population. In this study we aim at recording incidence of LVH at the time of diagnosis in a tertiary hospital.

Aims & Objectives: To monitor Left Ventricular Geometry in newly diagnosed hypertensives, and to study if there is a link between LVH & other indices of target organ damage.

Materials & Methods: Hospital based Prospective Analytical study was done in 100 Patients selected by random sampling procedure matching the inclusion criteria. A pretested pro forma was used Follow up was done on inpatient admission and on outpatient department basis.

Results: 78 OP & 22 IP patients were studied of which 68 were male and 32 were female LVH was seen in 27% study sample. In the present study, it was observed that there is significant correlation between the prevalence of microalbuminuria and the presence of LVH ($P < 0.001$) and LV dysfunction ($P < 0.002$) in hypertensive patients. Hypertensive patients with microalbuminuria were 9.4 times more likely to develop LVH than patients with normal UAE (95% CI: 4.2 - 21.6). ?

Conclusion: LVH at the time of diagnosis of hypertension has higher risk of presence of other target organ damages, hence can be used as indicator for prognosis and need for strict monitoring and control of blood pressure recordings with regular follow ups.

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Introduction:-

In accordance with most major guidelines, it is recommended that hypertension be diagnosed when a person's Systolic blood pressure (SBP) in the office or clinic is ≥ 140 mm Hg and/or their Diastolic blood pressure (DBP) is ≥ 90 mm Hg following repeated examination 1.

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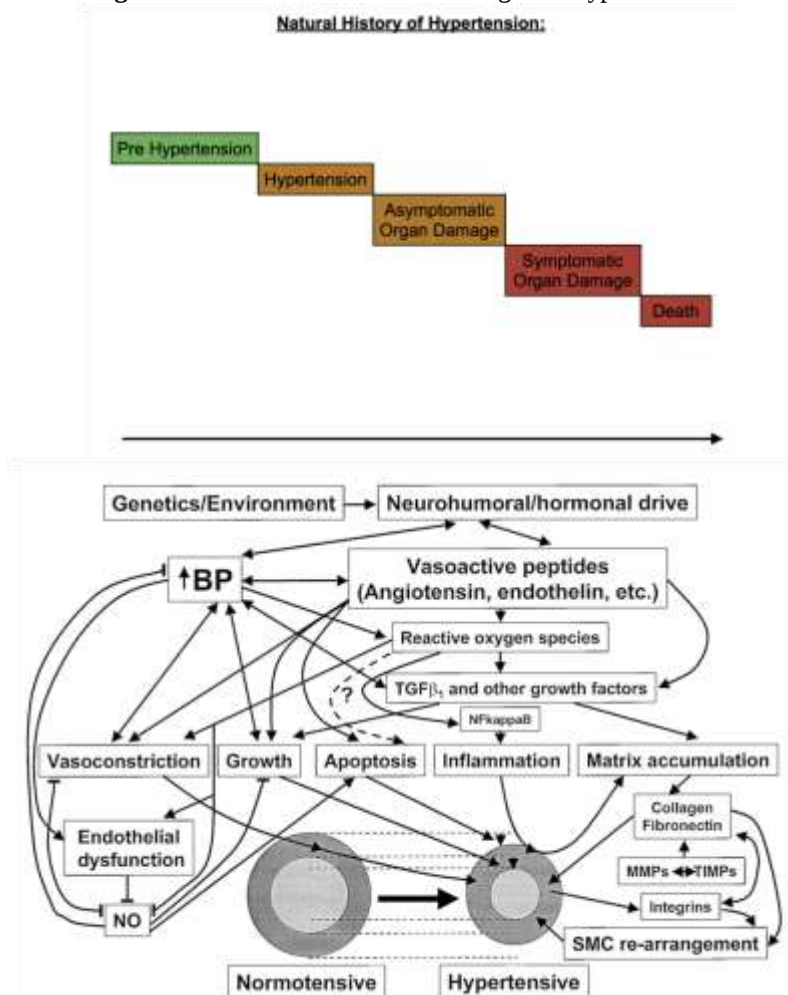
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Table 1:- Classification of Hypertension(2020 ISH Guidelines).

Category	Systolic (mmHg)		Diastolic (mmHg)
Normal	< 130	And	< 85
High Normal	130 - 139	And / Or	85 - 89
Grade I	140 - 159	And / Or	90 - 99
Grade II	> 160	And / Or	> 100

Blood pressure and the risk of cardiovascular disease events have a continuous, consistent association that is not dependent of any other risk factors. The brain, heart, kidneys, and eyes are among the organs that are damaged due to uncontrolled hypertension

Despite the well-known hazards, uncontrolled hypertension is under- treated in the majority of patients, owing to the disease's asymptomatic nature - particularly in the first five to twenty years, even while it destroys various organ systems. The meta analysis of landmark studies showed early drug therapy in uncontrolled hypertension is cost effective in long run. This led a concept that hypertension treatment should not be based on target organ damage, rather based on preventive basis.

Fig 1:- Vascular and Endothelial changes in Hypertension.

Effects on CVS: The heart is overworked due to increased systemic pressure. Initially, the heart compensates by thickening the left ventricle's walls, resulting in concentric left ventricular hypertrophy. The magnitude of the association between hypertension and cardiovascular disease varies according to the specific cardiovascular outcome. Using data from multiple studies, a 10 mmHg reduction in systolic pressure is projected to produce a 26 percent relative reduction in risk of stroke, a 16 percent relative reduction in risk of coronary disease, and a 26 percent relative reduction in risk of heart failure. For routine workup of patients with hypertension, a 12-lead ECG is advised, and simple criteria (Sokolow-Lyon index, Cornell index and Cornell voltage duration) are available to determine the existence of LVH. The sensitivity of an ECG-LVH is very low, so a two-dimensional trans-thoracic echocardiogram (TTE) or traditional 2d Echo is the preferred method for determining LVH and other relevant parameters such as LV geometry, left atrial volume, LV systolic and diastolic function, and others.

Aims and Objectives:-

1. To monitor Left Ventricular geometry in Naïve hypertensives.
2. To monitor, If there was a link between LVH and indices of target organ damage.

Methods & Materials:-

Place of the Study: The present study was carried out at Dr. Pinnamaneni Siddhartha Institute of Medical Sciences and Research Foundation (Dr.PSIMS& RF), a tertiary care hospital in Andhra Pradesh. Study Population: The patients presented to Dr PSIMS & RF who were recently diagnosed of hypertension are studied from November 2019 to November 2021 Study group: 1, Sample Number: 100, Study Design: Hospital based Prospective Analytical study

The relevant data was collected using a pre-tested pro-forma.

Inpatient admissions and outpatient department visits were followed up on. Statistical method: Chi-square test. For each variable, a P value was determined.

The odds ratio was estimated for those factors having a significant P value.

Inclusion Criteria:

1. Patients who have been diagnosed with hypertension i.e for at least three visits and have a systolic blood pressure of more than 140 mm hg and/or a diastolic blood pressure of more than 90 mm hg.
2. Age above 21 years.

Exclusion criteria:

1. Age below 21 years.
2. Known or newly detected T2DM patients
3. History of Cardiac disease.
4. History of Renal impairment.
5. History of any other End organ damage.
6. History of Genito-urinary tract infection
7. History of raised Serum Creatinine more than 1.5 mg/dl.
8. History of abnormal complete urine examination.

ECG was taken for all patients to look for LVH.

The Romhilt-Estes point score & Sokolow-Lyon Index system was used to recognise LVH. Two criteria were used together as there was low sensitivity if only one of them was taken.

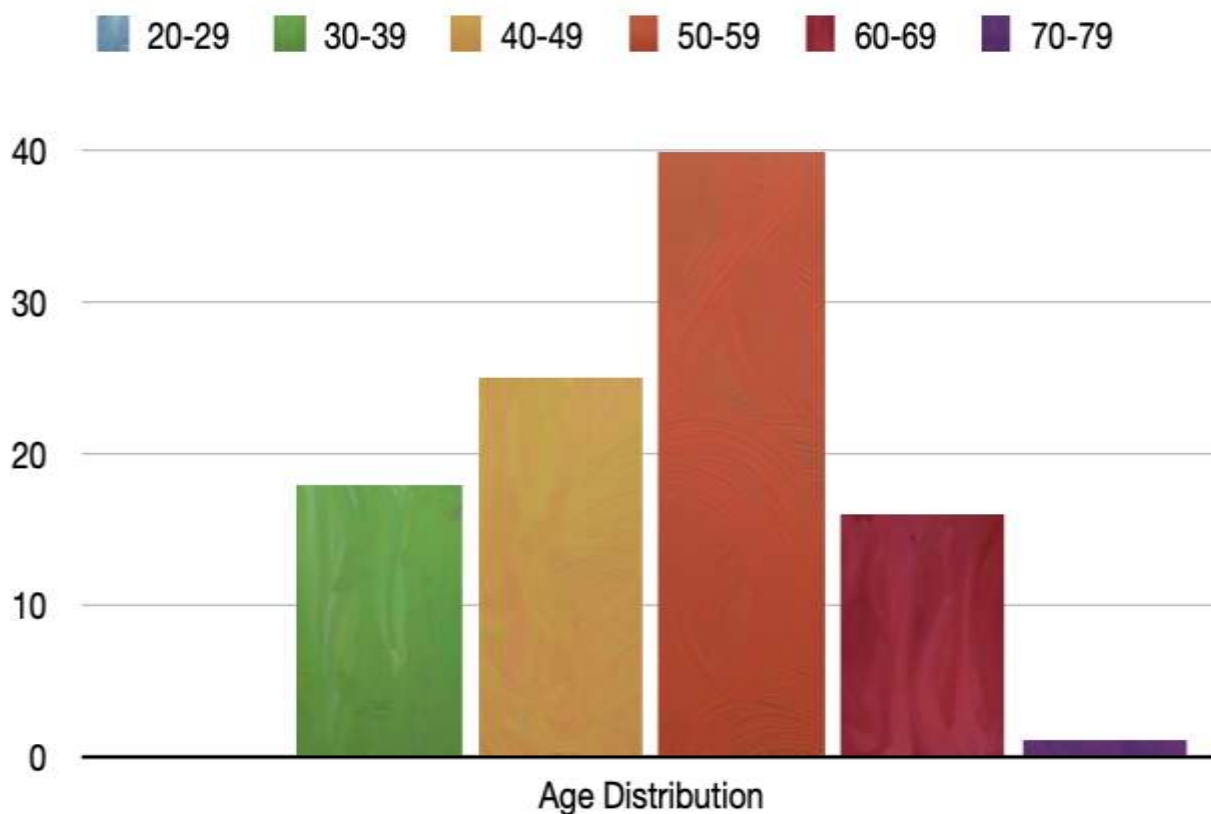
Echocardiogram: At the parasternal long axis view and apex, two- dimensional guided M-mode echocardiography was done; LVID at end systole and end diastole, as well as IV septum and posterior wall thickness, were measured according to American Society of Echocardiography criteria. A.

LV Geometry: Based on the LV mass and relative wall thickness measured by M mode ECHO, LVH is present or not. The upper limit of LV mass is considered normal (absolute value). 294 g for men, 198 g for women Concentric LV If the relative wall thickness was greater than 0.43 or the LV mass was higher, hypertrophy was observed. Devereux and Reichek "cube" formula : $LVM = 0.8 \times 1.04 \times [(IVSd + LVIDd + PWTd)^3 - LVIDd^3] + 0.6$ (LVIDd: LV internal diameter at end-diastole, PWTd: inferolateral (posterior) LV wall thickness at end-diastole, IVSd: ventricular septal thickness at end-diastole.). B. LV function: Systolic & Diastolic function. C. Chamber sizes and regional wall motion were assessed.

Results:-

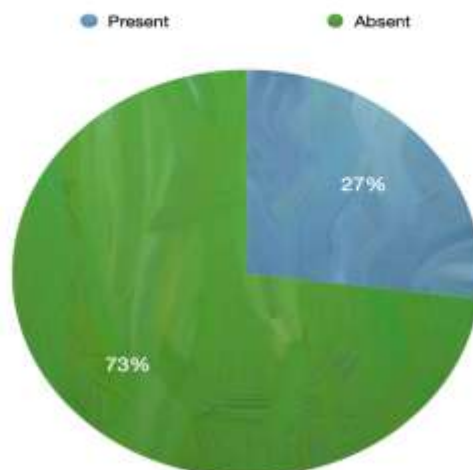
Out of 100 patients studied 78 were out patient & 22 were in patient.

Out of 100 subjects: 18 were in the age group of 30 - 39, 25 were in the age group of 40 - 49, 40 were in the age group of 50 - 59, 16 were in the age group of 60 - 69, 1 was in the age group of 70 - 79



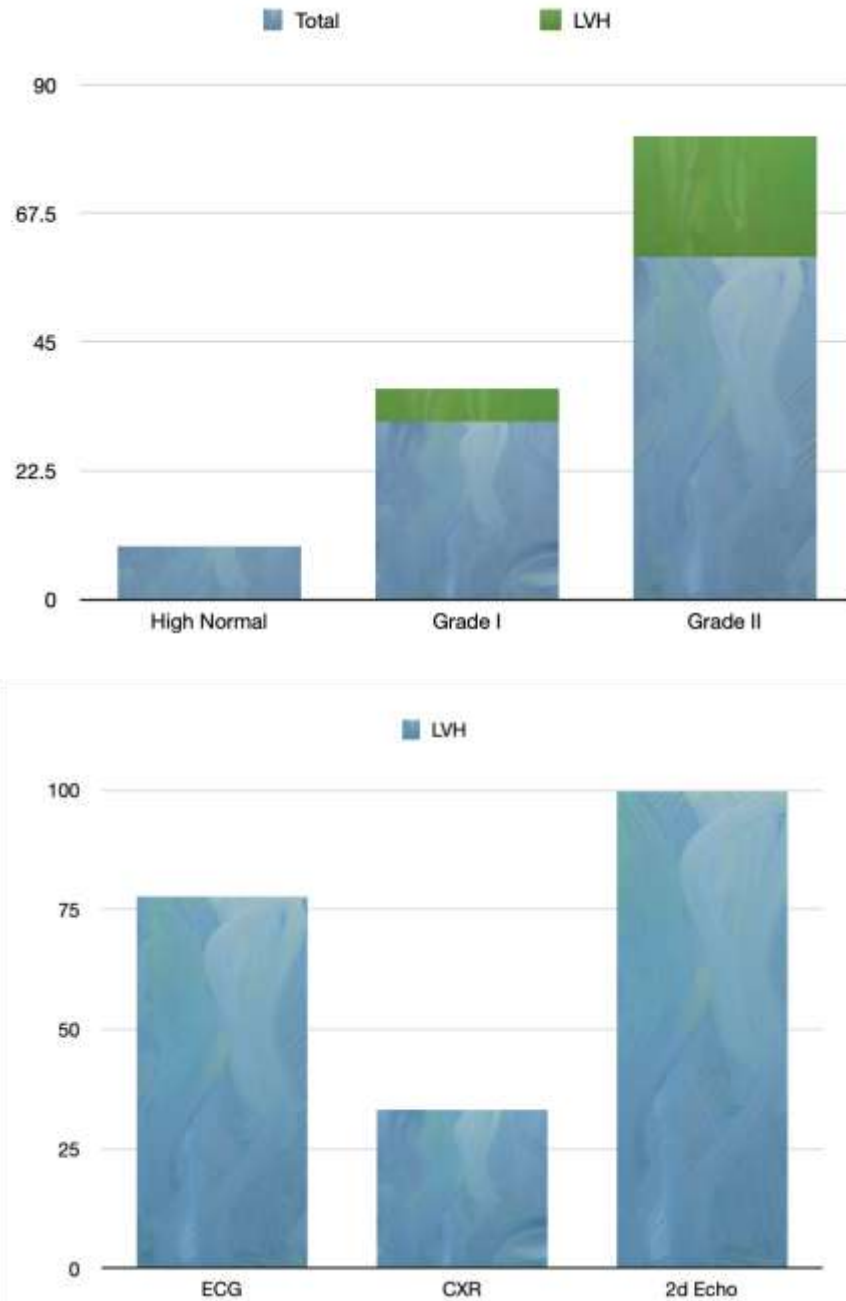
Out of 100 Patients :27 had Left ventricular hypertrophy. 17 of 68 males(25 %) hadLeftventricularhypertrophy, 10 of 32 Females (31 %) had Left ventricular hypertrophy

LVH	No
Present	27
Absent	73



Out of 27 patients with Left ventricular hypertrophy: • 6 patients were having grade I Hypertension. 21 patients were having grade II Hypertension.

Out of 27 patients with Left ventricular hypertrophy: 21 patients have fulfilled criteria with ECG. 9 patients have fulfilled criteria with CXR. 27 patients have fulfilled criteria with 2d Echo.

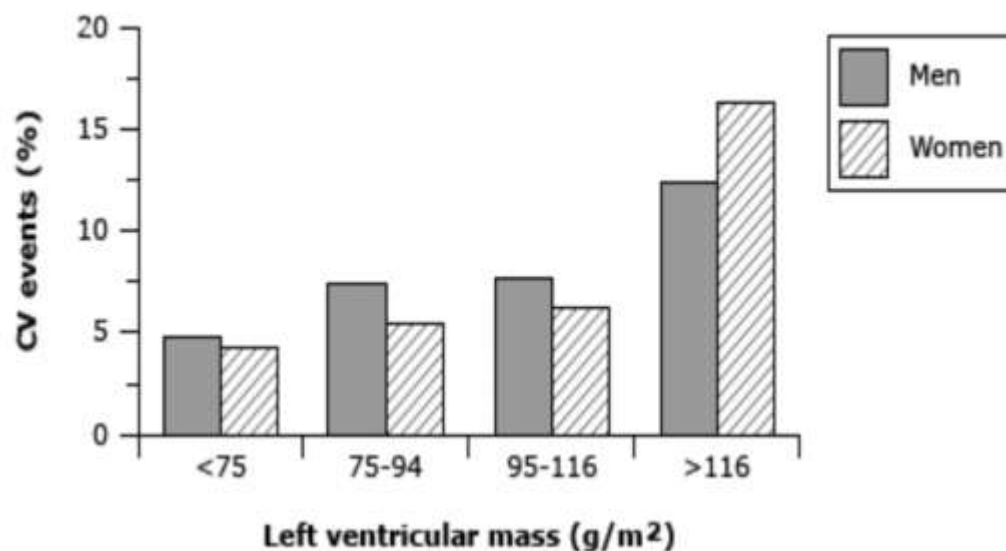


Discussion:-

The current study looked at the End/ Target organ damage especially Left Ventricular Mass alteration in non - diabetic Hypertensive patients. Many previous studies showed the direct relation to hypertension and LV remodelling in form of Hypertrophy. This had direct change in modifiable and un modifiable Cardiac risk. Framingham study showed that the increased LV mass had direct linkage toward Cardiovascular events .Four-year, age-adjusted incidence of cardiovascular events in men and women in the Framingham Study according to left ventricular mass determined by echocardiography. Subjects with increased left ventricular mass (far right panel) had a marked increase in cardiovascular risk

Framingham Study of Cardiovascular events with LVH

Jackson R et. al study revealed Cumulative absolute risk of CVD at 5 years according to systolic blood pressure and specified levels of other risk factors. The reference category is a non-diabetic, non-smoking 50-year-old woman with a serum TC of 154 mg/dL (4.0 mmol/L) and HDL cholesterol of 62 mg/dL (1.6 mmol/L). The CVD risks are given for systolic blood pressure levels of 110, 130, 150, and 170 mmHg. Sex distribution: In the present study 27 of 100 sample population were found to have Left ventricular hypertrophy. It was found more in females as compared to males but there was no statically significant difference in between the two groups. Contrary to Marcus R et.al study which showed male predominance. BMI of the patients It was more prevalent in Over weight and obese individuals which support the various studies, which revealed that BMI has an overt influence on remodelling measures in case of chronic hypertension and had an influence on the end organ damage as well. Cesare C, et.al analysed a total of 22 studies including 5486 obese individuals were considered. Overall, in the pooled obese population, prevalence of LVH, defined by 12 criteria, was 56.0%. Age Distribution The presence of LVH was also directly proportional to age of the population and also the stage of hypertension. The same was supported by Cesare c, et.al studied.



Conclusion:-

1. Hypertension a serious public health issue in the general population, with a considerable proportion of cases continuing untreated/ under treated .
2. Depending on the features of the population and the methodologies the procedures employed for and timing of examination for microalbuminuria and Left ventricular hypertrophy differs in various populations.

In our study Left ventricular hypertrophy was seen in 27 % of the study population, it was seen to have significant predisposition to microalbuminuria and stage of hypertension. This showed that stage of hypertension had direct link toward end organ damage early development.

Limitations:

This is an essentially an observational hospital based study and age, gender matched subjects are not chosen for analysis. Hence its results can't be attributed to general population. The small sample size of the study is one of the limitations for this study.

References:-

1. Unger, Thomas et al. "2020 International Society of Hypertension Global Hypertension Practice Guidelines." Hypertension (Dallas, Tex. : 1979) vol. 75,6 (2020): 1334-1357. doi:10.1161/HYPERTENSIONAHA.120.15026
2. " Hypertension " Harrison's Manual of Medicine, 20e Eds. J. Larry Jameson, et al. McGraw Hill, 2020, <https://accessmedicine.mhmedical.com/ content.aspx?bookid=2738§ionid=227557945>

3. Higashi, Y., Kihara, Y. & Noma, K. Endothelial dysfunction and hypertension in aging. *Hypertens Res* 35, 1039–1047 (2012). [https://doi.org/ 10.1038/hr.2012.138](https://doi.org/10.1038/hr.2012.138)
4. Muhl, C et al. "Cardiac remodelling: concentric versus eccentric hypertrophy in strength and endurance athletes." *Netherlands heart journal : monthly journal of the Netherlands Society of Cardiology and the Netherlands Heart Foundation* vol. 16,4 (2008): 129-33. doi:10.1007/BF03086131
5. Hadi, Hadi A R et al. "Endothelial dysfunction: cardiovascular risk factors, therapy, and outcome." *Vascular health and risk management* vol. 1,3 (2005): 183-98.
6. Aronow, Wilbert S. "Hypertension and left ventricular hypertrophy." *Annals of translational medicine* vol. 5,15 (2017): 310. doi:10.21037/atm.2017.06.14
7. Mahmood, Syed S et al. "The Framingham Heart Study and the epidemiology of cardiovascular disease: a historical perspective." *Lancet (London, England)* vol. 383,9921 (2014): 999-1008. doi:10.1016/ S0140-6736(13)61752-3.