

STUDY OF ECHO CARDIOGRAPHY FINDINGS AND ITS CORRELATION IN HYPERTENSIVE PATIENTS PRESENTING TO DAE HOSPITAL

Dr. Sridevi Sitaraman

PHYSICIAN/ Non-Interventional Cardiologist, DEPARTMENT OF ATOMIC ENERGY HOSPITAL, Kalpakkam, India.

*Corresponding Author

Article History

Received: 14.01.2026

Revised: 10.02.2026

Accepted: 24.02.2026

Published: 06.03.2026

Abstract: Hypertension is the most important risk factor of cardiovascular disease and death. The prevalence of hypertension in India is 315 million adult population. The global prevalence of hypertension is 1.28 billion people in age group of 30-80 years. Anatomical and functional changes of the heart can easily be detected by echocardiography, which is a safe and readily available study. In our study we studied both structural and functional aspects of hypertension like LVH and diastolic dysfunction in ECHO and their appearance and correlation of findings in cardiovascular diseases like heart failure, ischemic heart disease, so that early screening can pick up at a younger age group. So early screening of hypertensive patients is necessary to prevent cardiovascular complications like heart failure, MI and death. This is a retrospective study done in our Institution from Sep 2021 – Aug 2025 of 100 patients 20-79 years after obtaining ethical clearance and informed consent from all patients who had high BP record (primary hypertension) on medications with associated risk factors. Results: In our study we found that males <60 years were affected and females >60 years were having left ventricular hypertrophy findings in echo and diastolic dysfunction were more in women >60 years of age. In our study only these two findings were predominantly seen in echo. Family history of hypertension and other risk factors like DM, obesity, CAD also added to the echo findings like diastolic dysfunction. LVH usually occurs after 4 years of hypertension but in our study, it was found at younger age group and around 3 years of hypertension, which contributed to the risk factors which was unusual when compared to both national and international studies. Our study has made ECHO (noninvasive) test, is a mandatory tool for patients with hypertension as a structural and functional assessment of the heart in addition to ECG so that early diagnosis and management of hypertension and prevention of mortality due to CAD can be made.

Keywords: Echocardiography, left ventricular hypertrophy, diastolic dysfunction, noninvasive test

INTRODUCTION

Hypertension is the most important risk factor of cardiovascular disease and death. The prevalence of hypertension in India is 315 million adult population. The global prevalence of hypertension is 1.28 billion people in age group of 30-80 years. But of late young patients 20-30 years of age also develop hypertension due to various other confounding factors like family history of hypertension, sedentary lifestyle, eating habits, stress. Asians have the benefit of controlling heart diseases by strict control of hypertension than the western population. Heart disease as a result of hypertension is known to occur. Anatomical and functional changes of the heart can easily be detected by echocardiography, which is a safe and readily available study. LVH can be classified as mild LVH as: LV septal thickness 1.1-1.2 cm / 1.1-1.3 cm, moderate LVH as: 1.3-1.5 cm / 1.4-1.5 cm, and severe LVH as: ≥ 1.6 cm / ≥ 1.7 cm. The structural changes include left ventricular hypertrophy and LA dilatation. Functional changes like diastolic dysfunction, systolic dysfunction and myocardial strain can be appreciated. Other potential findings like mitral annular calcification and aortic valves clerosis is also seen in ECHO. In our study we studied both structural and functional aspects of hypertension like LVH and diastolic dysfunction in

ECHO and their appearance and correlation of findings in cardiovascular diseases like heart failure, ischemic heart disease, so that early screening can pick up at a younger age group. So early screening of hypertensive patients is necessary to prevent cardiovascular complications like heart failure, MI and death.

STUDY METHODOLOGY:

This is a **retrospective** study done in our Institution from **Sep 2021–Aug 2025 of 100 patients** 20- 79 years after obtaining ethical clearance and informed consent from all patients who had high BP record (primary hypertension) on medications with associated risk factors.

RISK FACTORS:

Factors taken into consideration for the study included age, sex, duration of hypertension, dyslipidemia, smoking, and family history of hypertension, metabolic syndrome and CVD. Cardiovascular disease screening was done in these patients with echo which tests the probability of CVD based on symptoms and asymptomatic patients as positive, negatives so that early diagnosis can be made for management.

INCLUSION CRITERIA:

In this study, we included male and female patients who had symptoms of headache, giddiness, palpitations, sweating, chest pain, dyspnoea, blurring vision or asymptomatic on medications and fresh cases also.

EXCLUSION CRITERIA:

Patients already having CAD, stroke, arrhythmias, other causes of secondary hypertension like pheochromocytoma, RAS, various endocrine disorders, medicine induced (steroids) for autoimmune conditions, old debilitated and pregnant patients were excluded.

RESULTS

In our study we found that males < 60 years were affected and females > 60 years were having left ventricular hypertrophy findings in echo and diastolic dysfunction were more in women > 60 years of age. In our study only these two findings were predominantly seen in echo. Family history of hypertension and other risk factors like DM, obesity, CAD also added to the echo findings like diastolic dysfunction. LVH usually occurs after 4 years of hypertension but in our study it was found at younger age group and around 3 years of hypertension which contributed to the risk factors which was unusual when compared to both national and international studies. Risk factors like dyslipidemia, obesity, hypertension, family history were present in both sex out of which family history and hypertension scored more for CVD risk. Although males are affected more with left ventricular hypertrophy findings but mortality is more with diastolic dysfunction which was more with women than men which is in line with national and international studies.

Table 1 – Age preponderance of Left Ventricular Hypertrophy

<60years	>60years
45	55

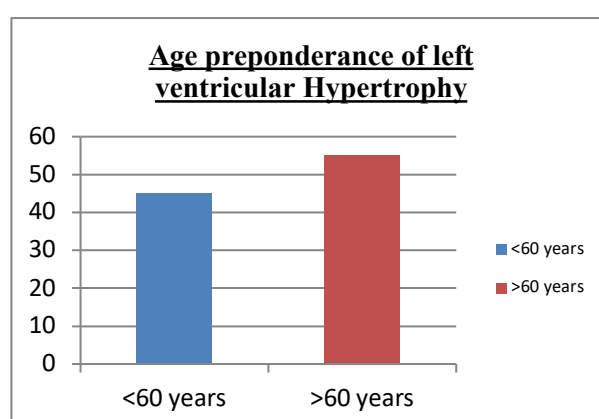
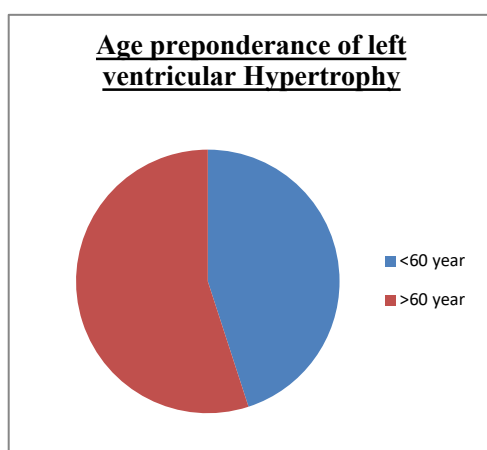


Table 2-Sex preponderance of Left Ventricular Hypertrophy

Males	Females
45	55

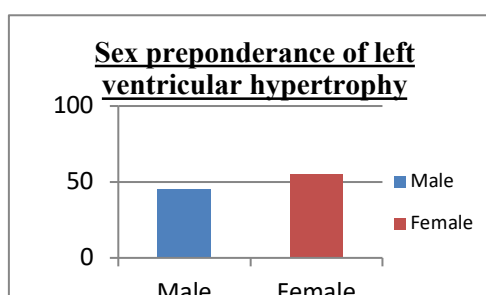
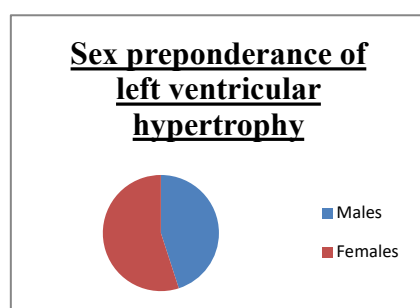
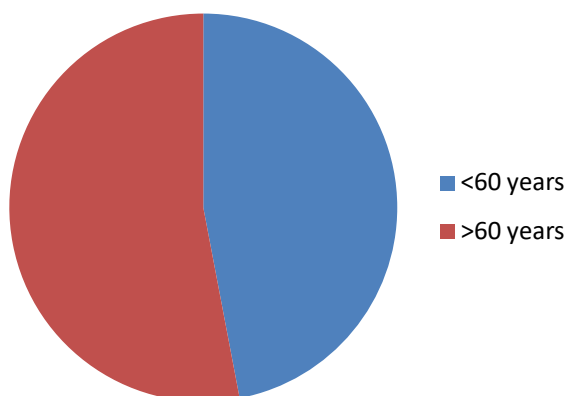


Table 3-Age preponderance of diastolic dysfunction

<60years	>60years
47	53

Age preponderance of diastolic dysfunction



Age preponderance of diastolic dysfunction

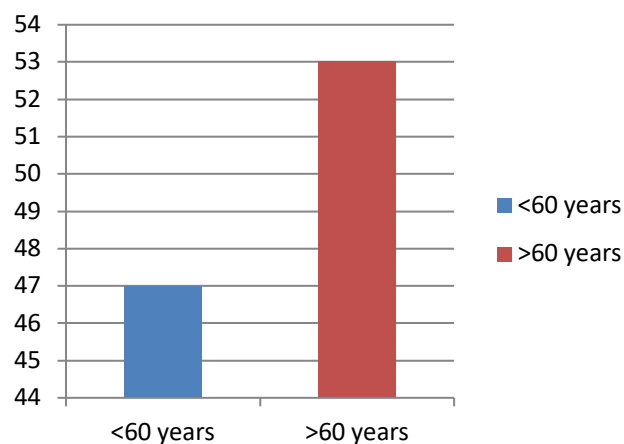
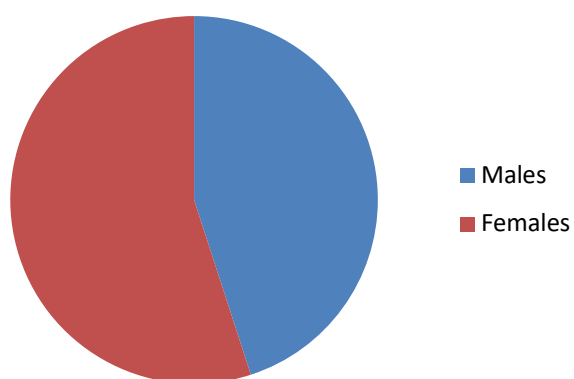


Table 4-Sex preponderance of diastolic dysfunction

Males	Females
45	55

Sex preponderance of diastolic dysfunction



Sex preponderance of diastolic dysfunction

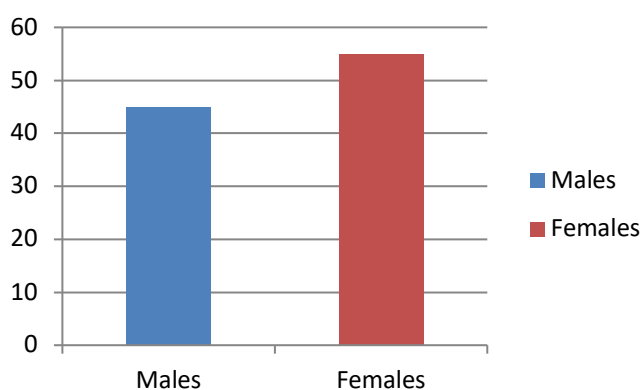


Table 5-Risk factors association with LVH and diastolic dysfunction

Risk factors present	LVH	DIASTOLICDYSFUNCTION
Family History of hypertension	45	55

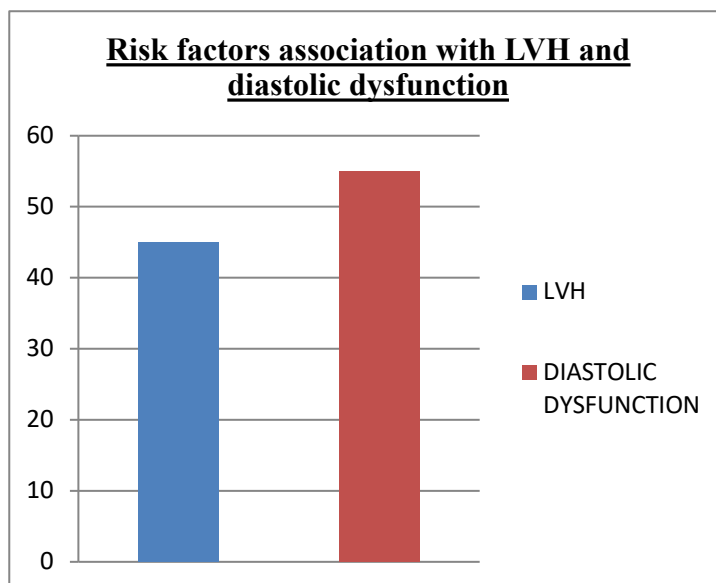
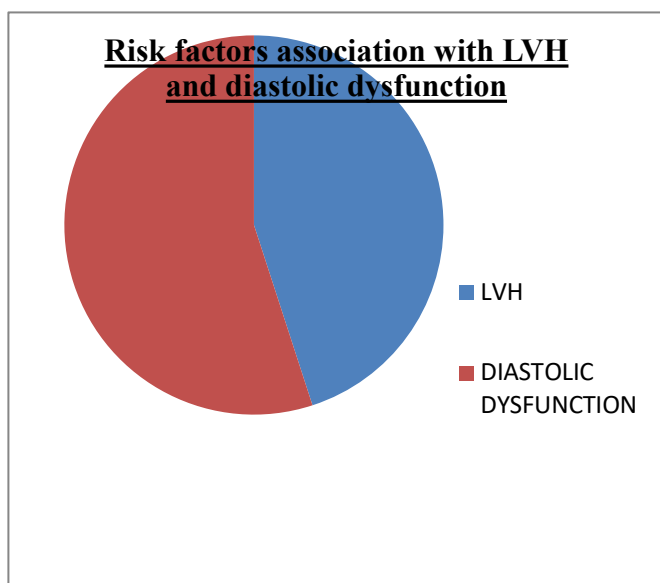
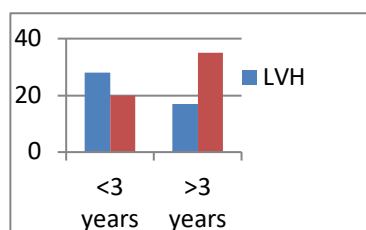
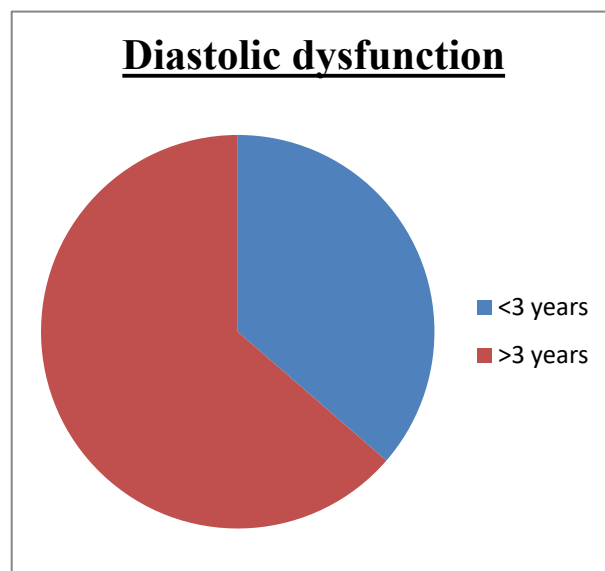
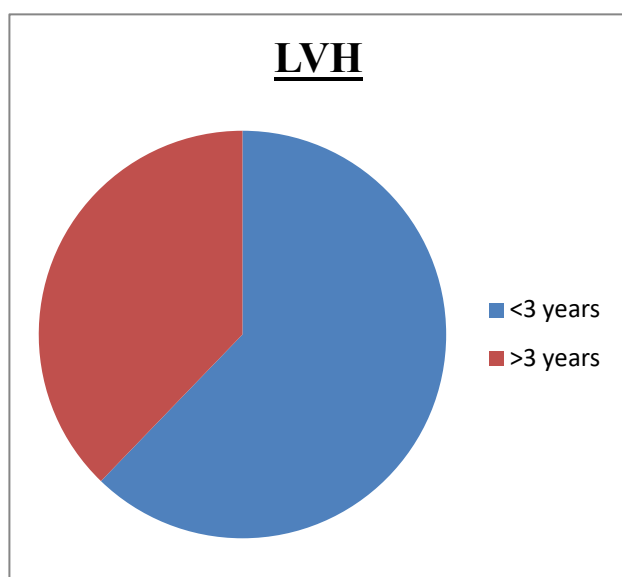


Table 6-Duration of hypertension and ECHO findings

Duration of hypertension	LVH	Diastolic dysfunction
<3years	28	20
>3years	17	35



DISCUSSION

COMPARISON WITH NATIONAL STUDY DATA:

In the present study, in comparison with national data males and females with hypertension had echo findings out of which females had more left ventricular hypertrophy >60 years of age than younger males <60 years which matches with national data. In our study, it was found that ECHO findings appeared at younger age group and around 3 years of hypertension, which contributed to the risk factors, which was unusual when compared to national studies. The risk factors like family history of hypertension, obesity, CAD contributed to these out of which family history of hypertension superseded. Diastolic dysfunction was found more in females >60 years than males which contributed to the mortality which was in line with national data. The presence of risk factors was mostly associated with CAD, which also matches with national data.

COMPARISON WITH INTERNATIONAL STUDY DATA:

In our study it was found that males <60 years and females >60 years were affected with LVH in echo which is not in line with international studies as there is more female preponderance in international studies. Diastolic dysfunction is more in women than men, which is in line with international data. The risk factors like CAD, obesity, family history of hypertension were found to be more associated in these patients, out of which family history superseded which is in line with international data. So the diagnostic yield of ECHO in hypertension (NONINVASIVE) was more significant and its correlation led to early proper management of the patients and prevention of mortality due to coronary artery disease which is in line with international data.

LIMITATIONS:

Many people having CAD, stroke, arrhythmias, other causes of secondary hypertension like OSA, pheochromocytoma, RAS, various endocrine disorders, medicine induced (steroids) for autoimmune conditions, old debilitated and pregnant patients like fragile patients, arthritis patients, valvular heart disease patients, COPD patients were not able to perform the ECHO test which led to limited use of this test.

CONCLUSION:

Our study has made ECHO (noninvasive) test, a mandatory tool for patients with hypertension as a structural and functional assessment of the heart in addition to ECG for so that early diagnosis and management of hypertension and prevention of mortality due to CAD can be made.

IMPLICATIONS ON SOCIETY:

Our study of ECHO findings in hypertension in concordance with national and international study data has proved that ECHO is a reliable and sensitive tool

which is non invasive to detect hypertension and its complications like CAD and it properly guides us with management at the earliest without any delay.

REFERENCES:

1. Das gupta K, Quinn R R, Zarnke K B, Rabi D M, Ravani P, Daskalopoulou S S, et al. Canadian Hypertension Education P. The 2014 Canadian hypertension education program recommendations for blood pressure measurement, diagnosis, assessment of risk, prevention, and treatment of hypertension.
2. James P A, Oparil S, Carter B L, Cushman W C, Dennison-Himmelfarb C, Handler J, et al. 2014 evidence- based guideline for the management of high blood pressure in adults: Report from the panel members appointed to the eighth joint national committee
3. Chobanian A V, Bakris G L, Black H R, Cushman W C, Green L A, Izzo JL, Jr, et al. Treatment of High Blood Pressure, National High Blood Pressure Education Program Coordinating C. These venth report of the joint national committee on prevention, detection, evaluation, and treatment of high blood pressure:
4. American College of Cardiology Foundation Appropriate Use Criteria Task F, American Society of E, American Heart A, American Society of Nuclear C, Heart Failure Society of A, Heart Rhythm S, Society for Cardiovascular A, Interventions, Society of Critical Care M, Society of Cardiovascular Computed T, Society for Cardiovascular Magnetic R, American College of Chest P, Douglas P S, Garcia M J, Haines D E, Lai W W, Manning W J, Patel A R, Picard M H, Polk D M, Ragosta M, Parker Ward R, Weiner R B.
5. Lang R M, Bierig M, Devereux R B, Flachskampf F A, Foster E, Pellikka P A, et al. Chamber Quantification Writing G, American Society of Echo cardiography' s G, Standards C, European Association of Echo. Recommendations for chamber quantification: Are port from the American Society of Echocardiography' s guidelines and standards committee and the chamber quantification writing group, developed in conjunction with the European association of echocardiography.
6. Jung H O, Sheehan F H, Bolson E L, Waiss M P, Otto C M. Evaluation of mid wall systolic function in left ventricular hypertrophy: acomparison of 3-dimensional versus 2- dimensional echo cardiographic indices.
7. Takeuchi M, Nishikage T, Mor-Avi V, Sugeng L, Weinert L, Nakai H, et al. Measurement of left ventricular mass by real- time three- dimensional echocardiography: validation against magnetic resonance and comparison with two- dimensional and m-mode measurements.
8. Aurigemma G P, Gottdiener J S, Shemanski L, Gardin J, Kitzman D. Predictive value of systolic and diastolic function for incident congestive heart

- failure in the elderly: the cardiovascular health study.
9. Mohammadi-Sichani M, Radmanesh F, Taheri S, Ghadimi K, Khodadadi S, Salehi H, Hatampour M, Kazemi R. Evaluation of glomerular filtration rate decline in patients with renal colic. *Am J Clin Exp Urol.* 2022 Feb 15;10(1):31-36.
 10. Singla N, Lay AH, Cadeddu JA. Poor split renal function and age in adult patients with ureteropelvic junction obstruction do not impact functional outcomes of pyeloplasty. *Can J Urol.* 2016 Oct 1;23(5):8457-64.
 11. Kumar K, Ahmad A, Kumar S, Choudhry V, Tiwari RK, Singh M, Muzaffar MA. Evaluation of renal histopathological changes, as a predictor of recoverability of renal function following pyeloplasty for ureteropelvic junction obstruction. *Nephro-Urology Monthly.* 2015 Jul 29;7(4):e28051.
 12. Wang YC, Chang D, Zhang SJ, Wang Q, Ju S. The accuracy of renal function measurements in obstructive hydronephrosis using dynamic contrast-enhanced mr renography. *American Journal of Roentgenology.* 2019 Oct;213(4):859-66.
 13. Li J, Pang H, Li W. Analysis of efficacy factors in unilateral obstructive severe renal insufficiency: a single-centre retrospective study. *BMC nephrology.* 2025 Feb 11;26(1):69.