

**Original article:**

**Study to establish the correlation of physical examination findings, chest X-ray and ECG patterns in severe hypertension with diastolic dysfunction as assessed by Echo-Doppler examination**

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**Abstract:**

**Introduction:** Diastolic dysfunction is common in patients of left ventricular disease including systemic hypertension. Sustained systemic hypertension imposes haemodynamic stress on the left ventricle and initiates its hypertrophy.

**Materials and methods:** The study sample consisted of 50 hypertensive patients selected from patients admitted to medicine department of Dr. D. Y. Patil Hospital And Research Centre, Pimpri, Pune over a period of 2 years. The mean age of the patients was 55 years (Range 40-90 years). Minimum level of diastolic blood pressure for inclusion in the study was more than or equal to 110 mm of Hg. The correlation between physical findings, chest x-ray and ECG findings also studied. X ray and physical examination was carried out in detail.

**Results :** Heaving apex was a prominent feature in 80% of cases. Left axis deviation was seen in 60% cases while S4 gallop, prominent pulmonary veins and left ventricular hypertrophy was observed in 40% of cases. None of the cases revealed loud A2 and left atrial enlargement.

**Conclusion:** Doppler echocardiography is useful, non invasive, easily available tool for the assessment of left ventricular diastolic function.

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**Introduction:**

Diastolic dysfunction is common in patients of left ventricular disease including systemic hypertension. Sustained systemic hypertension imposes haemodynamic stress on the left ventricle and initiates its hypertrophy. Hypertrophied left ventricular myocardium is stiff and fails to relax completely.<sup>1</sup> This ultimately causes disturbed diastolic function of the left ventricle resulting in various clinical manifestations. Even in the absence of left ventricular hypertrophy 47% of the patients of hypertension had Doppler evidence of diastolic dysfunction.<sup>39</sup> Measurements of diastolic velocities across the mitral valve helps to assess diastolic function of the left ventricle.<sup>2</sup> With this view present study was planned to assess diastolic dysfunction of the left ventricle in severe hypertension by echocardiographic , x ray , clinical examination and Doppler examination.

**Materials and methods:**

The present study was undertaken to assess left ventricular diastolic dysfunction in severe hypertension by echo-Doppler examination .

The study sample consisted of 50 hypertensive patients selected from patients admitted to medicine department of Dr. D. Y. Patil Hospital And Research Centre, Pimpri, Pune over a period of 2 years. The mean age of the patients was 55 years (Range 40-90 years). Minimum level of diastolic blood pressure for inclusion in the study was more than or equal to 110 mm of Hg.

Exclusion criteria

- 1) Patient with valvular heart disease.
- 2) Known case of diabetes mellitus.
- 3) Cardiomyopathy.

The patients were evaluated in the following way

1. Detailed history of hypertension and associated symptoms
2. Physical examination -

All studies were carried out by using a commercially available: "echocardiograph

(System V) manufactured by General Electric Wipro Logic 400 with a 3.5 MHz transducer.

The patients with severe hypertension were assessed for evidence of diastolic dysfunction by echo Doppler examination. The correlation between physical findings, chest x-ray and ECG findings also studied. X ray and physical examination was carried out in detail.

**Results:**

Table No. 1 The various physical findings, Chest X ray and electrocardiographic features in normal pattern of diastolic filling :

Normal pattern n = 11 cases

Sr. No.	Various Findings	No. Of Cases	%
1.	Heaving apex	7	63.6
2.	S4 gallop	4	36.3
3.	Loud A,	2	18.2
4.	Presystolic Bulge	3	27.2
5.	Prominent Pulmonary veins	3	27.2
6.	Left Ventricular hypertrophy	7	63.6
7.	Left ventricular hypertrophy with strain	4	36.3
8.	Left axis deviation	3	27.2
9.	Left atrial enlargement	3	27.2

Heaving apex was found in 7 of 11 cases (63.6 %) while next common finding was S4 gallop and left ventricular hypertrophy with strain pattern in 4 (36.3%) cases.

Table No. 2. The various physical findings, X-ray, and electrocardiographic findings in Pseudonormal pattern of diastolic dysfunction: Pattern - Pseudonormal n = 5

	Various Findings	No.Of Cases	%
1.	Heaving apex	4	80
2.	S4 gallop	2	40
3.	Loud A2	-	-
4.	Presystolic Bulge	1	20
5.	Prominent Pulmonary veins	2	40
6.	Left Ventricular hypertrophy	2	40
7.	Left ventricular hypertrophy with strain	1	20
8.	Left axis deviation	3	60
9.	Left atrial enlargement	-	-

**Discussion:**

Heaving apex was a prominent feature in 80% of cases. Left axis deviation was seen in 60% cases while S4 gallop, prominent pulmonary veins and left ventricular hypertrophy was observed in 40% of cases. None of the cases revealed loud A2 and left atrial enlargement.

The present study deals with various patterns of left ventricular diastolic filling and diastolic dysfunction in hypertension as assessed by echo Doppler study and their correlation with physical findings, chest X-ray and electrocardiographic observations. With consideration of above features it is clear that presence of heaving apex, S4 gallop, presystolic bulge, prominent pulmonary veins on chest film and electrocardiographic evidence of left ventricular hypertrophy and strain pattern are strongly associated with diastolic dysfunction in severe hypertension. They generally indicate abnormal relaxation type of diastolic dysfunction than Pseudonormal pattern.<sup>3</sup>

If each of nine variables i.e. - 1) Heaving apex, 2) Presystolic bulge, 3) Loud A2, 4) S4 gallop, 5) Chest X-ray PA view with prominent pulmonary veins, electrocardiographic findings 6) Left ventricular hypertrophy 7) Left ventricular hypertrophy with strain pattern 8) Left axis deviation 9) Left atrial enlargement is assigned with one point each, the average score for each pattern of diastolic filling can be established and constitutes a score of 5.82 equivalent to 6 indicates abnormal relaxation pattern of diastolic dysfunction, a point score of 3.27 equivalent to 3 indicates normal left ventricular filling pattern and a point score of 1.45 equivalent to 1 suggests pseudonormalisation pattern.<sup>4</sup>

Hence, in the absence of Doppler echocardiography facility, with the aid of above discussed nine variables and its point score system, a score more than or equal to 6 is a definite pointer to existence of abnormal relaxation type of diastolic dysfunction, a score between 3 to 6 for normal left ventricular filling pattern and between 1 to 3 indicative of pseudonormalisation.

**Conclusion:**

Doppler echocardiography is useful, non invasive, easily available tool for the assessment of left ventricular diastolic function

**References:**

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