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# Frequency of Diastolic Dysfunction in Hypertensive Patients by Echocardiography

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## Abstract

**Background:** Echocardiography is often the imaging modality of choice in hypertensive patients with diastolic dysfunction. Diastolic dysfunction may be exacerbated during exercise, especially if there is a marked increase in SBP. Doppler echocardiography has become the standard method for identifying and characterizing diastolic function. The management of diastolic dysfunction is audited, examining the relationship between symptom duration, use of pre-operative radiological imaging, and patient outcome. **Objective:** To determine the frequency of diastolic dysfunction in hypertensive patients by echocardiography. **Methodology:** Echocardiograph was done by a single operator using the (Toshiba power vision ® echocardiography) machine in Punjab Institute of Cardiology (PIC), Lahore Pakistan. The duration of the study was from July to October. A total of 48 patients were examined through a convenient sampling technique. Statistical software for social sciences (SPSS version 22.0) is used for the analysis of data. **Results:** A total of 48 patients were examined in the study. According to table 1, the mean age of the patients was 56.8. The minimum age was 40 and the maximum age was 80. The standard deviation was 10.14. According to table 2, 19(39.6) patients were females, and 29(60.4) patients were males. According to the table 3, 26(54.2) patients had diastolic dysfunction, and 22(45.8) did not have diastolic dysfunction. According to table 4, Out of 26 patients who were suffering from diastolic dysfunction, 14(29.2) patients had Grade 1 type diastolic dysfunction, and 12(29.0) had Grade 2 type of diastolic dysfunction. **Conclusion:** Diastolic dysfunction should be considered in the patient presenting with heart failure symptoms but with normal systolic function, particularly in hypertensive patients with left ventricular hypertrophy.

**Keywords:** Echo-Cardiography, Diastolic Dysfunction, Hypertension

## Introduction

Diastolic dysfunction (DD) is defined as "the inability of the LV to fill during rest or exercise, to a normal end-diastolic volume without an abnormal increase in LV ends diastolic pressure (LVEDP) (Appleton et al., 2000). The impaired diastolic function identifies hypertensive patients at increased cardiovascular risk, independently of left ventricular (LV) mass and ambulatory BP (Simone and Palmieri, 2001). It is thought that diastolic dysfunction begins early in hypertensive heart disease. The complex interplay of pressure and volume changes lead to various changes in wall dimension and geometric adaptations (Devereux et al., 2004). Diastolic function

parameters can be influenced by several factors such as age, left ventricular inflow, heart rate, left ventricular wall and chamber dimensions, systolic, and diastolic blood pressure (BP) (Balci and Yilmaz, 2002). Achieving good BP control and enhancement in systolic function has been shown to correlate with improvement in diastolic function in early hypertensive subjects (Almuntaser et al., 2009). Diastolic dysfunction is a common complication of chronically elevated blood pressure. Hypertension as a cause of congestive heart failure frequently is under-recognized, partly because, at the time the heart failure develops, the left ventricle at the stage of diastolic dysfunction is unable to generate the high blood pressure, thus obscuring the etiology of the heart failure (Beckett et al., 2008). High blood pressure is more prevalent in the general population. Hypertension significantly contributes to cardiovascular (CV) morbidity and mortality by causing substantial structural and functional adaptations, including diastolic dysfunction (DD), left ventricular hypertrophy (LVH), ventricular and vascular stiffness (Kolo et al., 2012). Chronic hypertension is the most common cause of diastolic dysfunction and failure (Verdecchia et al., 1990). Abnormalities of ventricular relaxation and the consequences of diastolic dysfunction may signify myocardial end-organ damage in patients who have hypertension, which precedes ventricular hypertrophy (Solomon et al., 2007). Isolated diastolic dysfunction is the impairment of isovolumetric ventricular relaxation and decreased compliance of the left ventricle. Symptomatic diastolic dysfunction is called diastolic heart failure (Aeschbacher et al., 2001). With diastolic dysfunction, heart meets the body's metabolic needs, whether at rest or during exercise, but at a higher filling pressure. With mild dysfunction, late filling increases until the ventricular end-diastolic volume returns to normal (Nadruz et al., 2017).

The rationale of the study is to determine the frequency of diastolic dysfunction in hypertensive patients by echocardiography as is it easiest and cheapest gold standard test for diagnosing different heart issues.

## Methodology

A cross-sectional study was carried out at Punjab Institute of Cardiology (PIC) Lahore, Pakistan. The duration of study was from July 2019 to October 2019. 48 patients were chosen subsequent to fulfill consideration (inclusion) and rejection (exclusion) criteria. A complete study and investigation were finished. All necessary examination was done. Diastolic dysfunction in hypertensive patients was confirmed by echocardiography of the patients. Statistical software for social sciences (SPSS version 22.0) is used for the analysis of data.

## Results

According to the table 1, the mean age of the patients was 56.8. The minimum age was 40 and the maximum age was 80. The standard deviation was 10.14.

Table 1: Age

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
age	48	40.00	80.00	56.8542	10.14572
Valid N (listwise)	48				

Figure 1: Age

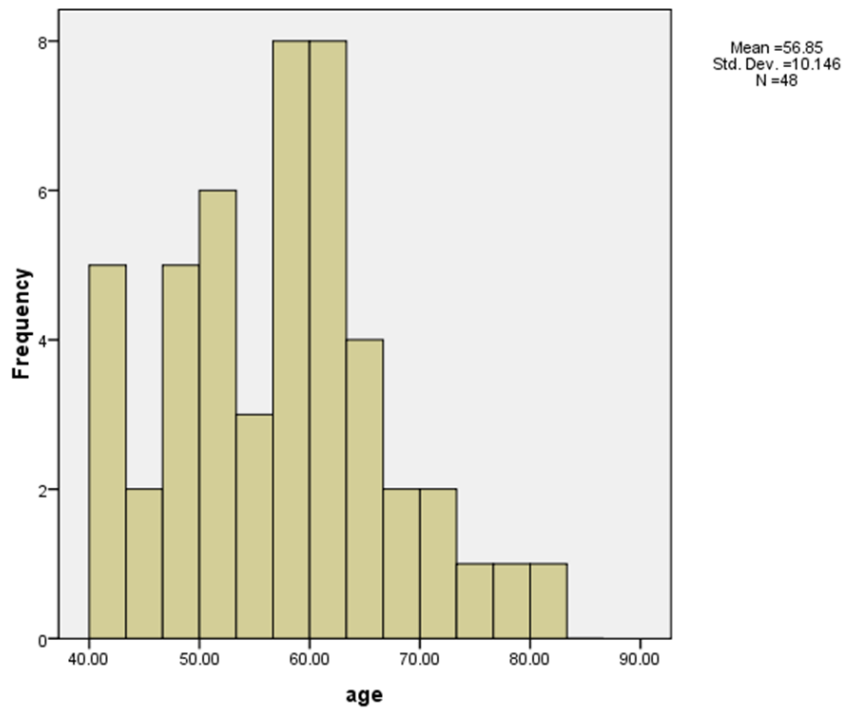


Table 2: Gender

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	female	19	39.6	39.6	39.6
	male	29	60.4	60.4	100.0
	Total	48	100.0	100.0	

According to table 2, 19(39.6) patients were females and 29(60.4) patients were males.

Figure 2: Gender

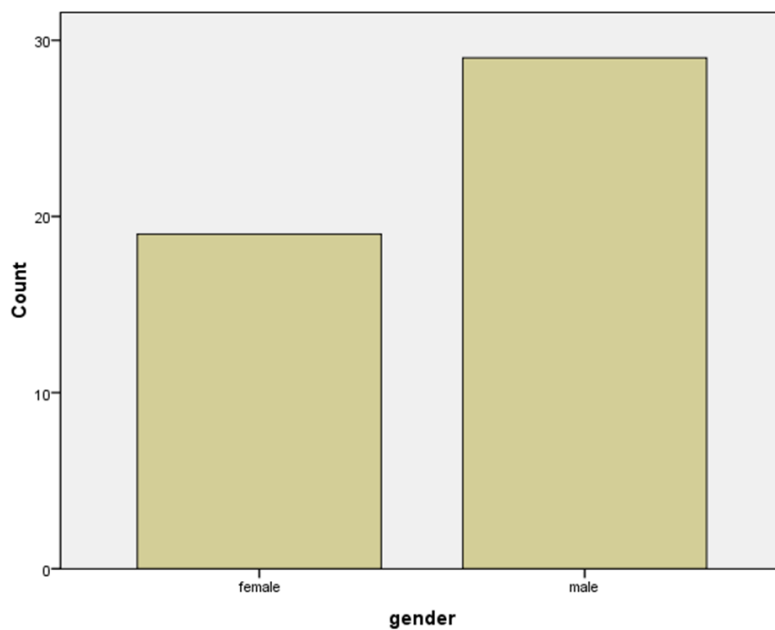


Table 3: Diastolic dysfunction

Diastolic Dysfunction					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	no	22	45.8	45.8	45.8
	yes	26	54.2	54.2	100.0
	Total	48	100.0	100.0	

According to the table 3, 26(54.2) patients had diastolic dysfunction and 22(45.8) did not had diastolic dysfunction.

Figure 3: Diastolic Dysfunction

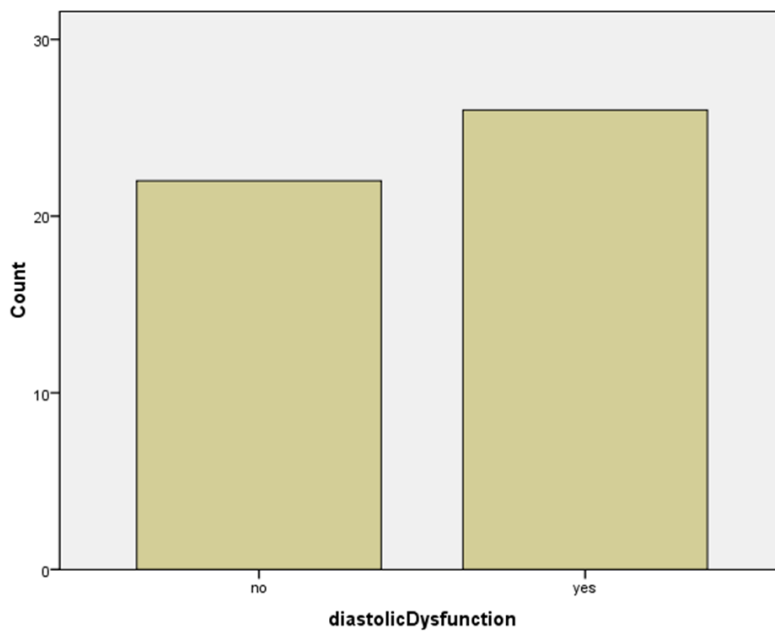
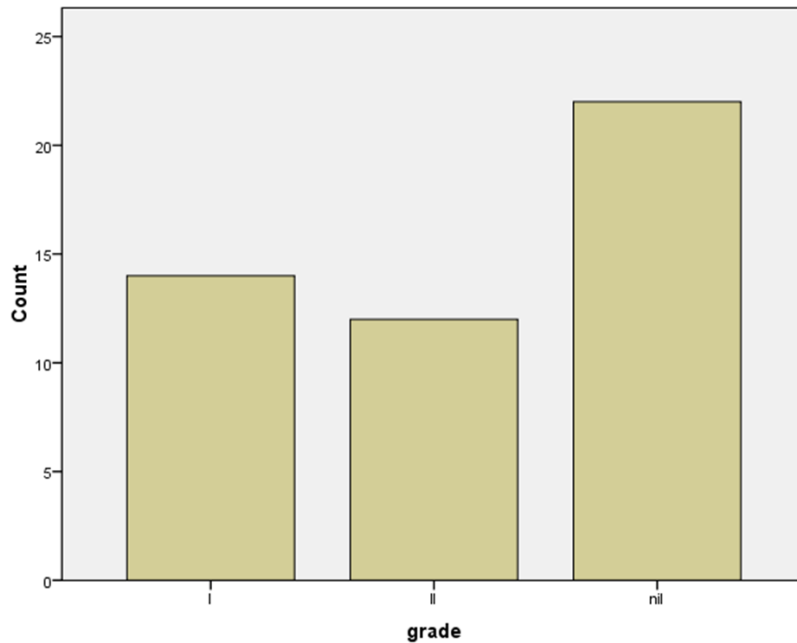


Table 4: Grade

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	I	14	29.2	29.2	29.2
	II	12	25.0	25.0	54.2
	nil	22	45.8	45.8	100.0
	Total	48	100.0	100.0	

Figure 4: Grade



## Discussion

The current study was designed to determine the Frequency of Diastolic Dysfunction in Hypertensive patients by Echocardiography. In 2003 RedField MM studied Burden of systolic and diastolic ventricular dysfunction in the community: appreciating the scope of the heart failure epidemic. Overall, 20.8% of the population had mild diastolic dysfunction, 6.6% had moderate diastolic dysfunction, and 0.7% had severe diastolic dysfunction, with 5.6% of the population having moderate or severe diastolic dysfunction with normal EF. The prevalence of any systolic dysfunction (EF < or =50%) was 6.0% with moderate or severe systolic dysfunction (EF < or =40%) being present in 2.0%. In comparative to my study, out of 48 patients, 26 were diagnosed with diastolic dysfunction. Among these 26 patients, 14 had Grade 1, and 12 had Grade 2 type of Diastolic dysfunction. In my study, the objective was to determine the frequency of diastolic dysfunction in hypertensive patients by echocardiography. In my study, 48 patients were subjected. Out of these 28, 26 had diastolic dysfunction of grades 1 and 2. In my study, out of 48 patients, 19(39.6) patients were females, and 29(60.4) patients were males. 26(54%) had diastolic dysfunction, and 22(45.8) did not have diastolic dysfunction, and 48 out of 48 patients had hypertension. Doppler tissue imaging has been developed to assess ventricular wall-motion velocity quantitatively for patients with various types of heart disease. This technique has a possibility of assessing right ventricular (RV) function reserve during exercise. The rationale of the study is to determine the frequency of diastolic dysfunction in hypertensive patients by echocardiography as is it easiest and cheapest gold standard test for diagnosing different heart issues.

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