Original article

Prevalence of Left ventricular diastolic dysfunction in newly diagnosed and never treated essential hypertension in tertiary care Hospital of Nepal

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Abstract

Introduction: Hypertension is a global public health problem with one fourth adults worldwide estimated to have high blood pressure (BP).[1] The incidence of hypertension continues to increase in all developed and developing societies as the population grows older and more obese.[2] The Framingham Study and other epidemiological surveys have clearly defined HTN as an important cause of morbidity and mortality. [2-3] the aim of this study was to determine the prevalence of Left ventricular diastolic dysfunction in newly diagnosed and never treated essential hypertension.

Methods: A cross sectional study was used for those patients who were attended outpatient clinic of Man Mohan centre with diagnosis of newly diagnosed and never treated hypertension over a period of October 2011 to November 2012.

Results: A total of 130 essential hypertensive patients underwent trans-thoracic echocardiography for evaluation of left ventricular diastolic function. Among 130 consecutive cases 56(43.1%) had normal Left ventricular diastolic function in echocardiography, 22(16.9%) patients had grade I LVDD, 50(38.5%) had grade II LVDD and 2 (1.5%) patients had grade IIIa LV diastolic dysfunction.

Conclusion: LV diastolic dysfunction was found to have very common preclinical myocardial dysfunction even in new and never treated essential hypertension.

Keywords: Hypertension, Echocardiography, Left Ventricular Diastolic Dysfunction

Introduction

The first scientific HTN survey in Nepal was done in 1981.[4] The prevalence of HTN according to old World Health Organization (WHO) criteria (160/95 mmHg) in the various parts of the country was 5.3% in Jumla to 10% in urban Kathmandu.[5] A study from Eastern Nepal in 2005 found a prevalence of almost 23% according to the Jet Navigation Chart (JNC) VII guidelines.[6] In a Teaching Hospital based observation in Nepal, 3.9% of the admitted patients were suffering from HTN. [7] In a descriptive hospital based study conducted in 3 central hospitals of Nepal, HTN complications were ranges from 16.0% to 36.0%. To prevent various complications, HTN must be properly diagnosed and demand adequate treatment.[8]

Hypertension is the commonest cardiovascular disorder. It is a precursor to major diseases like myocardial infarction, stroke, CCF, renal failure etc so also considered as Silent killer by the medical communities.[9] Overall 26.4% (972 million) of the adult world population was estimated to have hypertension in the year 2000, a figure that is projected to increase to 29.2% (1.56 billion) by the year 2025.[1] An epidemiological shift in the prevalence of hypertension in developing countries as compared to developed countries has been

observed. There are however very limited community based and hospital data on hypertension in Nepal.[6]

According to the World Health Report 2003, CVD was responsible for 29.2% (16.7 million) of the total global deaths and 3.9 million from hypertensive. Around 80% of CVD deaths took place in low and middle-income countries.[10] According to Nepal Health research council (NHRC),a hospital based study done in 2010 showed among CVD, prevalence of hypertension was (47%) followed by CVA, CCF, IHD, RHD and MI in Nepalese population is similar as that of WHO report in South East Asia Region. It reflects that Nepal is also facing the surging burden of HTN similar to other developing nations of South East Asia and trend towards global pandemic of Hypertension. [11]

Many international studies showed the heavy burden of hypertension and its complications are in low and middle income countries. Till now no organized studies on hypertension and its early complications have been conducted in Nepal. So the prevalence of preclinical left ventricular diastolic dysfunction in Nepalese hypertensive community are largely unknown. The present study has attempted to answer above question. This study is designed to know the prevalence of LV diastolic dysfunction in newly diagnosed and never treated essential hypertension. The entire study subjects had undergone baseline investigations including transthoracic echocardiography to assess the left ventricular diastolic function in outpatient basis.

Methods

This is a cross sectional study and ethical clearance was obtained from the Institutional Review Board of Research department of Institute of Medicine. Consecutive newly diagnosed and never treated hypertension cases from outpatient clinics of MCVTC were included in the study. Data were taken by the investigator by preformed questionnaire. Data were entered in SPSS statistical analysis tool and were descriptively analyzed. Patient with extreme ages, hypertension more than two years, with complications and comorbidities were not included in the study. The eligible subjects enrolled in the study were otherwise healthy and 30-55 years.

Results

A total of 130 patients enrolled in the study, predominantly 74(56.9%) were male and 56(43.1%) were female. Maximum number of patient were from between age group 35 to 50 years. Most of these patients were from valley and majorities were well educated.All the patients were asymptomatic and newly diagnosed never treated hypertension [(MeanSBP 155.1846 +-10.998mmHg); (Mean DBP 95.20+-5.543mmHg)] Table 1 and presented to doctors because either they have significant family history or found to have hypertension on regular check up.

Table 1. Level of Blood Pressure

Blood Pressure	Minimum	Maximum	Range	Mean	SE Mean	Median	SD
SBP Right Arm	140	200	60	155.1846	.96460	155.00	10.998
SBP Left Arm	140	200	60	152.53	.99529	150.65	11.348
DBP Right Arm	90	110	20	95.20	.48623	95.00	5.543
DBP Left Arm	90	110	20	93.61	.44700	92.70	5.096

Among 130 selected cases for echocardiography study 56(43.1%) had normal LV diastolic function, 22 (16.9%) had Grade I LVDD, 50(38.5%) had Grade II LVDD and 2(1.5%) had Grade III LVDD. ($p<0.01$) Figure 1 and individual indices of LVDD are shown in Graph 1.The LV mass index was greater in patient with LVDD cases, as was the prevalence of LV hypertrophy. Echocardiographic LVDD was correlated with changes with LV geometry. ($p<0.01$) Figure 2.

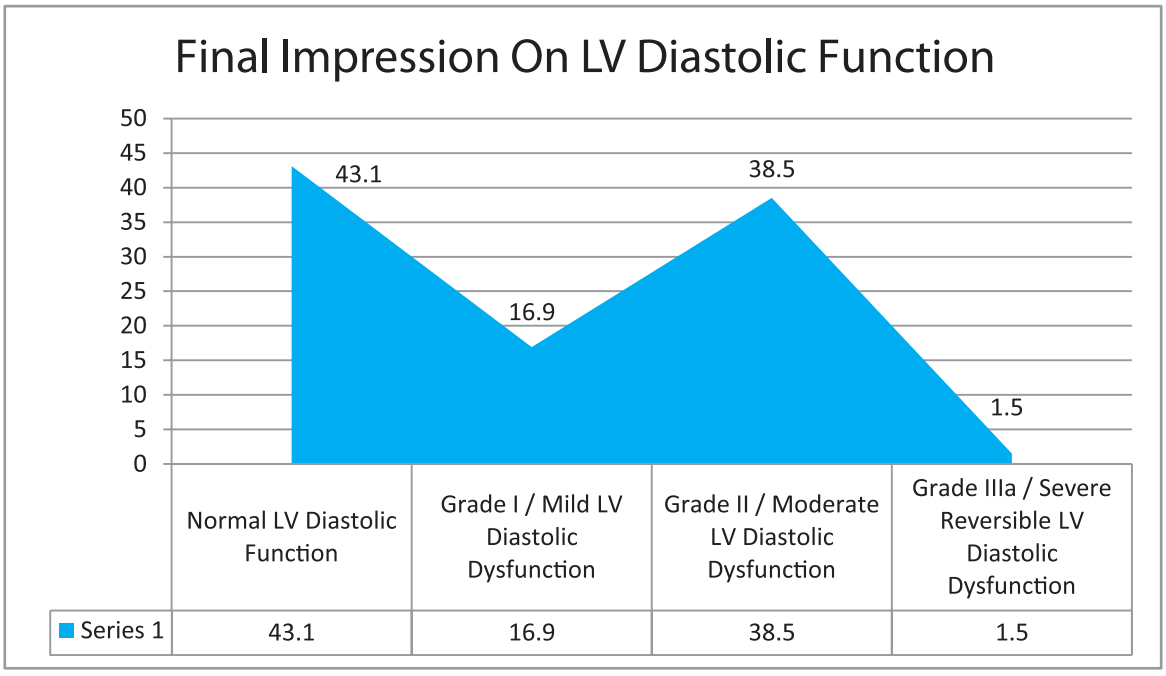
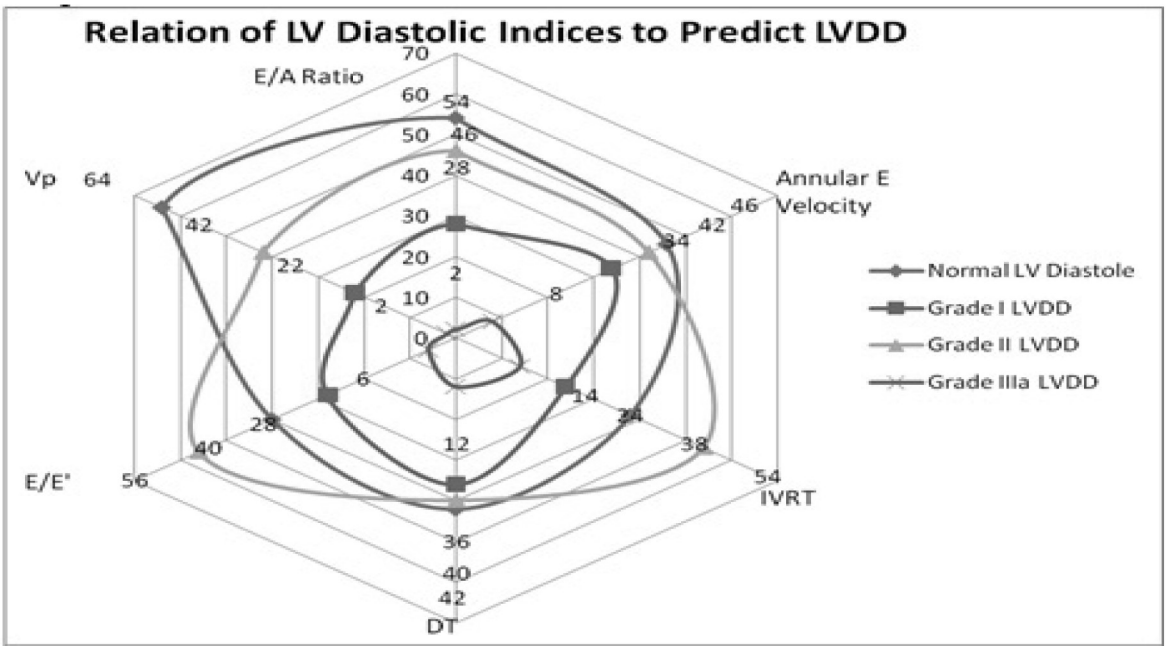


Figure 1. Final Echocardiographic impression on Left ventricular diastolic function



Graph 1. Relation of different diastolic indices to LV diastolic Function

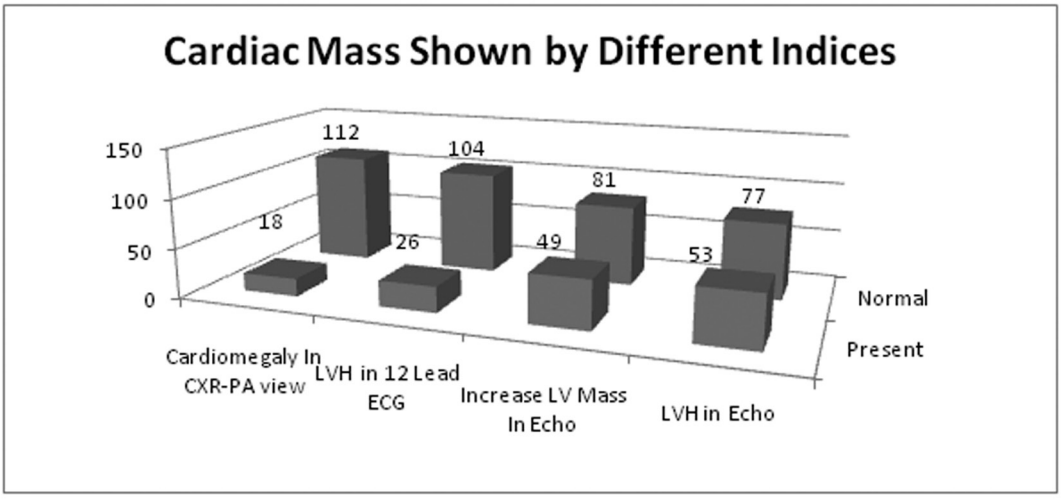


Figure 2. Cardiac mass shown by different indices in patient with Hypertension

In our study cardiac mass was interpreted by comparing cardiomegaly in CXR [n= 18/130, (13.8%)], LVH in 12 lead ECG [n= 26 /130, (20%)] and Echocardiographic increase in LV mass in [n=49/130, (37.7%)] and Concentric LVH [n=53/130;(40.8%)] respectively. The LV mass index was greater in those with LVDD cases; as was the prevalence of LV hypertrophy. LVDD was directly correlated with changes in LV geometry. (P <0.01)

Discussion

Systemic hypertension and its complications are responsible for a large portion of the hospital admissions worldwide, representing a very high socioeconomic cost annually. Cardiovascular diseases are responsible for the major death as well, with a direct relation between cardiovascular mortality and blood pressure levels. Hypertension is considered the most common and the importance cardiovascular morbidity in general adult population.[12,13,14]

Left ventricular diastolic dysfunction is frequent in case of essential hypertension, older people, ischemia, obese woman and diabetics. Diastolic heart weakness prevalence rises with age. Framingham's study gave prognosis meaning to LVH (enlarged LV mass) and endothelial dysfunction. It is associated with enlarged risk of sudden death, death caused by cardiovascular disease, independent of other risk factors LV mass enlarged for gram increases risk of sudden death almost twice and endothelial damage as a part of progressive cardiovascular dysfunction. [2] We have excluded these above patients from the study to minimize this bias. Our study population consists of patient with age 30 to 55 years and majority from age 35 to 50 years with newly diagnosed essential hypertension that were never treated. They were categorized into two groups – patient with normal left ventricular diastolic functionanddiastolic dysfunction.

Diastolic dysfunctionis a risk factor for the development of cardiovascular morbidity, and has prognostic value in population settings.Diastolic dysfunction is very frequent and is actually sign of manifest heart weakness. Many of patients with heart weakness have isolated left ventricular diastolic dysfunction (LVDD). New diagnostics methods like Echo Doppler study enables precise and early diagnosis of LVDD[13,14,15], So, we tried to utilize the role of echocardiography in our study. The purpose of this study is to demonstrate prevalence and importance of LVDD in new and untreated hypertensive patients.

In our study, we demonstrated that in a hospital based hypertensive patients without overt cardiac disease, diabetes, and other comorbidities which have an independent negative impact on LV diastolic function were excluded from the study. We showed that hypertension were independently associated with a higher E/E' ratio, an index of LV end diastolic pressure, even after adjustment for covariates that significantly affect diastolic function such as age, LVM, geometry, heart rate, and LVEF. The finding of a higher LV end-diastolic pressure in hypertension, could explain in

part the additional risk of developing LV Diastolic Dysfunction and diastolic heart failure in patients.

The overall prevalence of diastolic dysfunction in the hypertension according to study based on adult hypertensive nigerians published in ghana medical journalwas 82.86%. Prevalance of LV Diastolic Dysfunction in Hypertensives in Europe had 46%-48%. The works of Kingue et al in Cameroon, and Balogun and Co-workers in Nigeria earlier referred to, documented 67.4% and 58% prevalence, respectively. Prevalence of LVDD in study based on London by Mayet et al was found to have 68%. Work of Philips et al rather discovered abnormal left ventricular filling rates only in patients with systolic blood pressure (SBP) higher than 130mmHg, but not in those patients with SBP lower than 130mmHg. We have noted that in our study the prevalence rate of LVDD for the patients with new untreated HTN (56.9%) approximated and well correlated with above studies. (P<0.05)Echocardiography evaluation of LV diastolic function in this study is comparable with many of the studies done in different part of the world including US, Europe and Asian countries.[15]

Conclusion

On analysis of 130 subjects our study with untreated and newly diagnosed Essential Hypertension who underwent Echocardiography for LV Diastolic evaluation, revealed prevalence of LVDD in 74 (56.9%) patients and 56(43.1%) had Normal LV Diastolic function.Among LVDD 20 (15.38%) had found to have Grade I LVDD, 48 (36.92%) had Grade II LVDD and 2 (1.5%) were found to have Grade IIIa LVDD which is statistically significant.(P<0.05)

In newly diagnosed and never-treated hypertensive patients, echocardiographic LVDD is associated with greater myocardial mass and related with preclinical functional impairment of LV diastolic function. This relationship of increased BP, increased LV mass and change in LV geometry and increase LV Diastolic Dysfunction in our study, strengthens the role of echocardiography as an early and reliable marker of preclinical cardiac involvement in subjects with hypertension. This study also further confirmed that LVDD is a powerful discriminator of high cardiovascular risk; is indicator of preclinical structural and functional changes in newly diagnosed as well as never treated Essential hypertensive patients.

Conflict of interests: None Declared

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