

A Prospective Study of Various Anti Hypertensive Drugs on Reversal of Left Ventricular Hypertrophy in Hypertensive Bangladeshi Population.

MA Muqueet¹, M Mahmood², J Arzu², R I Litu³, MG Azam⁴, H Hoque¹, Nilufar Fatema⁵, KMHSS Haque⁶

¹Associate Professor, Department of Cardiology, Bangabandhu Sheikh Mujib Medical University.

²Department of Cardiology, Bangabandhu Sheikh Mujib Medical University.

³Professor of Cardiology, Uttara Adhunik Medical College, Dhaka.

⁴Associate Professor, National Institute of Cardio-Vascular Disease, Dhaka.

⁵Consultant, Department of Cardiology, Bangabandhu Sheikh Mujib Medical University.

⁶Former Chairman, Department of Cardiology, Bangabandhu Sheikh Mujib Medical University.

Received: September 2016

Accepted: October 2016

Copyright: © the author(s), publisher. It is an open-access article distributed under the terms of the Creative Commons Attribution Non-Commercial License, which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

ABSTRACT

Background: Regression of ventricular hypertrophy is the restoration of normal ventricular structure and physiology after the hypertrophy has developed. It has been clearly demonstrated that once left ventricular hypertrophy (LVH) is diagnosed, it represents a strong blood pressure independent risk factor for cardiovascular morbidity and mortality. Aims and Objectives: The aim of this study is to compare the effectiveness of different anti-hypertensive agents in reducing LVH in Bangladeshi population. **Methods:** A prospective observational study was carried out to detect the regression of left ventricular hypertrophy in hypertensive Bangladeshi population using high resolution M-mode echocardiographic study in 110 patients with clinically diagnosed hypertension were included in this study but later 15 patients failed to attend clinic for subsequent follow up. Hence, total number of patient was 95; The mean age (\pm SD) of these patients were 42 ± 5 and male-female ratio was 8.5:1.5. Out of these 95 patients, 20 were included in Beta-blocker(BB) group, 14 in Angiotensin converting enzyme inhibitor(ACEi) group, 20 in Beta-blocker(BB) + Diuretic(DD), 14 were recruited in Angiotensin enzyme inhibitor(ACEi) + Diuretics(DD) and 13 in Beta-blocker and ACEi group and 14 in BB + ACEi + Diuretic group. We followed these patients after 8 weeks, 6 months, 1 year and 2 years in our clinic. A baseline M-mode echocardiography was done to document LVH. During this follow up, we have measured IVSd, PWd, LVIDd and LVIDs and statistically analyzed SD and P-value for each group by using SPSS software. The duration of study was from 01.07.2005 to 30.06.2008. **Results:** Comparison of Beta blocker alone and ACEi alone group for LVH regression showed a P value of 0.59. Although this figure did not show a statistically significant value if we increase number of patients in both group we would expect a statistically significant P value in favour of ACEi. BB plus diuretics was compared with ACEi plus Diuretics which showed P value of 0.85. We also compared BB plus ACEi group with BB plus ACEi plus DD for LVH regression which showed a P value of 0.79. **Conclusion:** Among three groups of anti-hypertensive drugs, angiotensin converting enzyme inhibitor(ACEi) alone has been found to be most effective as compared to Beta blockers when used alone than in combination groups with (Beta blocker plus ACEi plus Diuretics or Beta blocker plus ACEi). Although, these figure was not found statistically significant a clear benefit has been shown in all groups in terms of LVH regression and essentially if the power or size if this is increased a statistically significant value of LVH regression value may be observed in all these groups.

Keywords: Anti Hypertensive Drugs, ACE Inhibitors, Ventricular Hypertrophy.

INTRODUCTION

Ventricular hypertrophy is defined as thickening of the left ventricular myocardium due to an adaptive process in response to increase ventricular wall stress due to pressure overload, volume overload or in hypertrophic cardiomyopathy. Regression of ventricular hypertrophy is the restoration of normal ventricular structure and physiology after the hypertrophy has developed. It has been clearly demonstrated that once left ventricular hypertrophy is diagnosed, it represents a strong blood pressure

independent risk factor for cardiovascular morbidity and mortality.

Name & Address of Corresponding Author

Dr. Muqueet MA
Associate Professor, Department of Cardiology,
Bangabandhu Sheikh Mujib Medical University,
Dhaka, Bangladesh.

Increased LV mass has been shown to be an independent predictor of cardiovascular morbidity and mortality.^[1,2]

More than 1000 experimental and clinical studies on regression of myocardial hypertrophy have been published during the last three decades, but no definitive conclusions have emerged from the literature. In a database of 50 studies with a double-blind, randomized, controlled clinical trial comprising a total of 1715 patients with essential hypertension, 165 patients were randomized to a placebo and 1550 subjects to one of the four hypertensive drug classes. After weighing for difference in patients number LV mass was reduced to 12% for ACEi^[3,4], 11% for calcium channel blockers^[5], 5% for beta-blockers^[6] and 8% for diuretics^[7]. However, a recent study has shown better regression of LVH with diuretics Indapamide than ACEi.^[3]

The long-term effect of anti-hypertensive on echocardiographic proven LVH was prospectively investigated in an unblinded, non-randomized trial over 5 years of treatment (27/28). In 82% of all patients included in trial, almost complete regression of LVH was achieved. A variety of anti-hypertensive agents has been used in the trial prohibiting any further comparison between the anti-hypertensive agents. The question therefore remains of whether the greater ability of reducing LV mass by different anti-hypertensive agents correlate well with the combined end points of long-term morbidity and mortality of hypertension with left ventricular hypertrophy.

Moreover, most of these studies have been done in western world in mainly Caucasians and black population. Scientific data on regression of left ventricular hypertrophy with intensive blood pressure control by various anti-hypertensive therapies and their effect on LV mass with long-term effects on morbidity and mortality in South Asian population are very scanty. It is particularly relevant to investigate this as we are aware that hypertension, obesity, diabetes and coronary artery disease have been found to interact with each other and found to be more prevalent in this region possibly due to increased insulin resistance, dietary habits, genetic factors, raised homo-cystine and other emerging risk factors in a changing socio-economic scenario in this region.

MATERIALS AND METHODS

Subjects:

Hypertensive patients attending department of Cardiology at BSMMU were screened by the inclusion and exclusion criteria and Informed consent was obtained from all patients.

Study design:

A prospective observational study was carried out to detect the regression of left ventricular hypertrophy in hypertensive Bangladeshi population using high

resolution M-mode echocardiographic study in 110 patients with clinically diagnosed hypertension were included in this study but later 15 patients failed to attend clinic for subsequent follow up. Therefore, these patents were not included in this study. Hence, total number of patient was 95; mean age (\pm SD) of these patients were 42 ± 5 and male-female ratio was 8.5:1.5.

Out of these 95 patients, 20 were included in Beta-blocker(BB) group, 14 in Angiotensin converting enzyme inhibitor(ACEi) group, 20 in Beta-blocker(BB) + Diuretic (DD),14 were recruited in Angiotensin enzyme inhibitor (ACEi) + Diuretics (DD) and 13 in Beta-blocker and ACEi group and 14 in BB + ACEi + Diuretic group.

We followed these patients after 8 weeks, 6 months, 1 year and 2 years in our clinic. A baseline M-mode echocardiography was done to document LVH. During this follow up, we have measured IVSd, PWd, LVIDd and LVIDs and statistically analyzed SD and P-value for each group by using SPSS software. The duration of study was from 01.07.2005 to 30.06.2008. The study was funded by University Grants Commission of Bangladesh and undertaken by Department of Cardiology, BSMMU. Before drug therapy was started, a questionnaire was used to assess suitability of the patient to be included in this study by following a strict inclusion and exclusion criterion.

Inclusion criteria:

- 1) Age: > 20 yrs
- 2) LVH-LVMI >120 (men)
LVMI > 100 (women)
- 3) Acceptable echo quality
- 4) ECG-LVH

Exclusion criteria:

- 1) Unreadable M-mode echo
- 2) Parasternal view- Non axial
- 3) Cardiomyopathy
- 4) Valvulopathy
- 5) Myocardial wall motion abnormality
- 6) Asymmetrical septal hypertrophy
- 7) Dilated left ventricle (LVIDd> 60 mm)
- 8) Coronary artery disease
- 9) Symptomatic heart failure
- 10) Hypersensitivity to antihypertensive drugs used in the study.
- 11) Body wt >130% of ideal weight
- 12) ACEi and Diuretics taking >3 months.

RESULTS

Statistical Analysis:

Data were statistically analyzed by using SPSS software. All descriptive data are expressed as mean \pm SD.

Table 1: Regression of LVH by BB and ACEI groups.

Echo measurements	Beta blocker (BB) (Mean ±SD) (n=20)		ACE inhibitor(ACEI)(Mean±SD) (n=14)	
	Before	After	Before	After 6m
IVSd	13.00±0.82	12.00±0.71	13.33±1.03	12.55±0.91
PWd	13.00±0.82	11.83±0.57	13.33±1.03	12.58±0.80
LVIDd	37.50±5.06	39.75±6.85	45.33±2.65	46.00±2.97
LVIDs	21.00±3.55	23.00±4.32	29.50±3.51	29.33±3.27

Table 2: Regression of LVH by BB+ diuretic and ACEI+ diuretic groups.

Echo measurements	BB+ Diuretic (Mean ±SD) (n=20)		ACEI +Diuretic(Mean ±SD) (n=14)	
	Before	After	Before	After
IVSd	13.50±0.71	12.75±0.35	13.67±1.15	12.00±0.00
PWd	13.50±0.71	12.90±0.14	13.33±0.58	11.83±0.29
LVIDd	47.50±0.71	49.00±0.00	47.67±5.51	50.33±4.93
LVIDs	25.50±3.54	26.00±1.41	34.33±9.45	32.00±9.54

Table 3: Regression of LVH by (BB+ACEI) and (BB+ACEI+ diuretic) groups:

Echo measurements:	BB+ACEI group(Mean±SD) (n=13)		BB+ACEI+diuretic group (Mean±SD) (n=14)	
	Before	After	Before	After
IVSd	15.00±3.61	13.67±3.06	14.33±1.53	12.83±0.76
PWd	15.67±2.08	14.33±2.31	13.33±0.58	12.60±0.79
LVIDd	49.00±11.53	48.00±10.82	39.67±4.04	43.33±4.16
LVIDs	34.67±15.57	35.00±15.00	27.00±2.00	29.33±2.52

Table 1 show there is no significant difference between Beta blocker and ACEi group for LVH regression (p= 0.59). Table 2 shows there is no significant difference between BB plus DD group and ACEi plus DD for LVH regression (p= 0.85).

Table 3 & 4 shows there is no significant difference between BB plus ACEi group and BB plus ACEi plus DD for LVH regression (p= 0.79)

DISCUSSION

One “strict” meta-analysis, including only double-blind, randomized, controlled clinical studies with parallel-group design (39 trials) found that more LVH regression occurred with greater blood pressure reduction and a longer duration of therapy^[8] Specifically, LVH regression occurred in 13% of patients treated with the ACE inhibitors, 9% treated with calcium channel blockers, 6% treated with β-blockers, and 7% treated with diuretics, ^[8] suggesting that overall, the ACE inhibitors were probably the best drugs for LVH regression.

This study has proved and is consistent with all previous randomized trial which showed ACEi as the most effective anti hypertensive agent for LVH regression when used alone. Comparison of Beta blocker alone and ACEi alone group for LVH regression showed a P value of 0.59 [Table 1]. Although this figure did not show a statistically significant value if we increase number of patients in both group we would expect a statistically significant P value in favour of ACEi. BB plus diuretics was compared with ACEi plus Diuretics, which showed P value of 0.85 [Table 2]. We also compared BB plus ACEi group with BB plus ACEi plus DD for LVH regression which showed a P value of 0.79 [Table 3]. Although these figure was

not found statistically significant a clear benefit has been shown in all groups in terms of LVH regression and essentially if the power or size if this is increased a statistically significant value of LVH regression value may be observed in all these groups. Therefore, we plan to undertake a more elaborate study to compare these antihypertensives for LVH regression in the near future. To undertake this study further funding and equipment facilities and manpower support will be required in future.

CONCLUSION

Among three groups of anti-hypertensive drugs, angiotensin converting enzyme inhibitor(ACEi) alone has been found to be most effective as compared to Beta blockers when used alone than in combination groups with (Beta blocker plus ACEi plus Diuretics or Beta blocker plus ACEi).

REFERENCES

- Haider AW, Larson MG, Benjamin EJ, and Levy D. Increased left ventricular mass and hypertrophy are associated with Increased risk for sudden death. J Am Coll Cardiol. 1998; 32: 1454-1459.
- Schmieder RE, Martus P, and Klingbeil A. Reversal of left ventricular hypertrophy in essential hypertension. A meta-analysis of randomized double-blind studies. JAMA. 1996; 275: 1507-1513.
- Antonaccio MJ, Rubin B, Horovitz ZP, Laffan RJ, Goldberg ME, High HP, et al. Effects of chronic treatment with Captopril (SQ 14,225), an orally active inhibitor of angiotensin I-converting enzyme, in spontaneously hypertensive rats. Jpn J Pharmacol. 1979; 29:285-94
- Sen S, Tarazi RC, Bumpus FM. Effects of converting enzyme inhibitor (SQ 14, 225) on myocardial hypertrophy in spontaneously hypertensive rats. Hypertension. 1980; 2 : 169-76

5. Rowlands DB, Glover DR, Ireland MA, McLeay RAB, Stallard TJ, Watson RDS, Little WA. Assessment of left-ventricular mass and its response to antihypertensive treatment. *Lancet*. 1982; 2: 467-70
6. Hill LS, Monaghan M, Richardson PJ. Regression of left ventricular hypertrophy during treatment with antihypertensive agents. *Br J Clin Pharmacol*. 1979; 7 (suppl 2): 255s-60s
7. Idikio H, Fernandez PG, Triggle CR, Kim BK. Regression of left ventricular hypertrophy and control of hypertension in the spontaneously hypertensive rate (SHR): Oxprenolol versus hydrochlorothiazide. *Clin Invest Med*. 1983; 6:43-8
8. Schmieder RE, Martus P, Klingbeil A. Reversal of left ventricular hypertrophy in essential hypertension: a meta-analysis of randomized double-blind studies. *JAMA*. 1996; 275: 1507–1513.

How to cite this article: Muqueet MA, Mahmood M, Arzu J, Litu RI, Azam MG, Hoque H, Fatema N, Haque KMHSS. A Prospective Study of Various Anti Hypertensive Drugs on Reversal of Left Ventricular Hypertrophy in Hypertensive Bangladeshi Population. *Ann. Int. Med. Den. Res*. 2016; 2(6):ME63-ME66.

Source of Support: Nil, **Conflict of Interest:** None declared