ISSN- O: 2458 - 868X, ISSN–P: 2458 – 8687
Index Copernicus Value: 49. 23

International Journal of Medical Science and Innovative Research (IJMSIR)
IJMSIR : A Medical Publication Hub
Available Online at: www.ijmsir.com
Volume – 3, Issue –3, May - 2018, Page No. : 87 - 92

A Study on Clinical Efficacy of Calcium Channel Blockers and Angiotensin Receptor Blockers in Hypertension with Left Ventricular Dysfunction

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Type of Publication: Original Research Paper

Conflicts of Interest: Nil

Abstract

Hypertension is often caused by the excessive extracellular fluid which consists of mean arterial blood pressure is greater than 110mmHg under resting condition is usually considered to be hypertensive and this level occurs when diastolic blood pressure is greater than 90mmHg and systolic blood pressure is greater than about 135-140mmHg .Patients who met the inclusion criteria visited to hospital with hypertension are collected Demographic details, chief complaints, lab data, medication chart, 2D echo imaging parameters are noted by using patient data collection form. In the present study we have enclosed 120 patients who met the inclusion criteria and parameters are collected from Physical examination, 2D-Echo imaging. The drugs recorded mainly those who are prescribed with amlodipine (CCB) and telmisartan (ARB) from case reports of patients. The mean differences for CCB's and ARB's followed as EDD(0.412 and 0.508),ESD(2.103 and2.270),EF(3.75 and 4.73),triglycerides(3.65 and 4.82),FS(3.05 and 5.2881),Systolic BP(27.76 and31.00),diastolic BP(16.92 and 19.00).In this study, we observed less regression for amlodipine when compared with telmisartan under similar conditions of blood pressure, as it is effective in protecting the progression of hypertension, LV hypertrophy and mild to moderate diastolic dysfunction. It mainly demonstrates the Initial use of calcium channel blockers in hypertensive patients might be superior to ARBs for prevention of stroke and MI events, independent of their antihypertensive effect.

Keywords : Hypertension, Left Ventricular Dysfunction,2D Echo Imaging.

Introduction

Hypertension is often caused by the excessive extracellular fluid which consists of mean arterial blood pressure is greater than 110mmHg under resting condition is usually considered to be hypertensive and this level occurs when diastolic blood pressure is greater than 90mmHg and systolic blood pressure is greater than about 135-140mmHg and in severe hypertension, the mean arterial pressure rise to 150 to 170mmHg (systolic greater than 250mmHg and diastolic greater than 130mmHg) and high pressure almost causes multiple hemorrhages in the kidneys, producing many areas of renal destruction and

eventually kidney failure, uremia and death[1]. Hypertension is also caused by the primary aldosteronism in which aldosterone increases the rate of reabsorption of salt and water by the tubules of the kidneys[2]. In secondary Hypertension lowering blood pressure too quickly may comprises of tissue perfusion and can cause cerebral damage ,coronary or renal insufficiency which is followed by first-line treatment for hypertension include calcium channel blockers and angiotensin receptor blockers[3]. Hypertension is directly responsible for 57% of all stroke deaths and 24% of all coronary heart disease deaths and cardiac complications in India[4]. Anti-hypertensive therapy should be necessary for regression of aquainted rise of blood pressure and its associated cardiovascular complications[5] According to the Hypertension optimal treatment –A observational study on correlation between the optimum blood pressure and the occurrence of cardiovascular events was high and it indicates the use of antihypertensive therapy should be necessary[6.] Angiotensin receptor blockers mainly shows the advantageous action other than reduction of blood pressure, such as reduction of proteinuria and heart failure risk in CHF patients and calcium channel blockers mainly reduces the non-fatal stroke in hypertensive patients[7].Most of the recent trials shown that ARB/CCB combination have beneficial effects on blood pressure and diastolic function when compared with ARB/diuretic combinations therapy[8]. Doppler echocardiography is a powerful non-invasive tool for identification of the characteristics of left ventricular filling, ejection fraction, mitral flow, producing insight mechanisms of diastolic function and its impression on filling pressures of the left ventricle[9].Disturbances of left ventricular filling mainly depends on two factors such as a compliant chamber in diastole which allows the filling of left ventricle from left atrial pressure and another one stiff chamber a systole which ejects the stroke volume[10].Persons With mild dysfunction, late filling drastically rises until the ventricular end-diastolic volume will becomes to normal, In severe cases, the ventricle becomes stiffen that the atrial muscle cannot be able to work and end- diastolic volume cannot be normalized with increased filling pressure as this process suppress the cardiac output leads to effort intolerance[11].

Materials And Methods

The study was carried out at tertiary care teaching hospital and it's 900 bedded hospitals. On an average about 500 out-patients and 200 in-Patients are treated and admitted per day respectively. Patients who met the inclusion criteria visited to hospital with hypertension are collected Demographic details, chief complaints, lab data, medication chart, 2D echo imaging parameters are noted by using patient data collection form. In the present study we have enclosed 120 patients who met the inclusion criteria and parameters are collected from Physical examination, 2D-Echo imaging.

Inclusion criteria and Exclusion criteria

- The study include patients with stroke, hemiparesis, hypertension with left ventricular dysfunction.
- Inpatient department of General medicine and Cardiology diagnosed with hypertension with left ventricular dysfunction.
- Male and female patients of age 35-85yrs.
- Patients who are not willing to give the consent.
- All patients of age below 34 years.
- Patients with pregnancy.

Data obtained from the study were categorized based on various parameters for interpretation. Various parameters like Demographic details, chief complaints, lab data, medication chart, 2D echo imaging parameters are noted by using patient data collection form and Evaluation of patient health after giving antihypertensive medication are

noted and left ventricular dysfunction parameters are collected from the 2d Echo imaging along with other factors will be done by using available medical records and patient case sheets. Enrollment of subjects who met the study criteria. The purpose of the study was explained in detail and informed consent was taken from the patient attendants who were willing to participate in the study.

Table 1: Age Wise Distribution of Patients in Calcium Channel Blockers.

Age	Male	Percentage	Female	Percentage
35-45Yrs	8	20%	3	15%
45-55Yrs	11	27.5%	5	25%
55-65Yrs	11	27.5%	7	35%
65-75Yrs	9	22.5%	3	15%
75-85Yrs	1	2.5%	2	10%

The above table shows the most number of cases in the 55-65Yrs which contains 11male patients (27.5%),7 female patients(35%),followed by 45-55Yrs of 11 male patients(27.5%),5 female patients(35%),followed by 65-75Yrs of 9 male patients (9%),3(15%) female patients and 35-45Yrs contains 8 male patients(20%),3female patients(15%), 75-85Yrs contains 1 male patient(2.5%),2 female patients(10%) .

Table 5.2: Age wise Distribution of Patients in Angiotensin Receptor Blockers

Age	Male	Percentage	Female	Percentage
35-45Yrs	7	22.5%	2	6.89%
45-55Yrs	7	22.5%	13	44.8%
55-65Yrs	9	29.03%	8	27.5%
65-75Yrs	6	19.35%	3	10.34%
75-85Yrs	2	6.49%	3	13.79%

The above table shows that most number of the cases were in the age group of 55-65Yrs which contains 9 male patients (29.03%) and in 45-55Yrs 13 female patients (44.8%) followed by 45-55Yrs which contains 7 male patients (22.5%),55-65Yrs 8(27.5%),female patients and in 35-45Yrs ,7 (22.5%) male patients,65-75Yrs 3(10.34%) female patients, In 75-85Yrs 2(6.49%) male patients and in 35-45Yrs 2(6.89%) female patients.

Table5.5: Mean value of Systolic blood pressure for two different drugs

The above table indicates the mean values of systolic blood pressure for different drugs which includes calcium channel blockers and angiotensin receptor blockers and their mean differences followed as 27.76 ±1.161 for CCB's and 31.00±0.529 for ARB'S . The obtained values showing.

	CCB'S			ARB'S			P-Value
Parameter	Baseline Mean	End point Mean	Mean difference	Baseline Mean	Endpoint Mean	Mean difference	
Blood pressure	150.86± 7.44	123.00± 3.59	27.76± 1.161	155.75± 3.99	124.75± 4.06	31.00± 0.529	0.0124

followed as 27.76 ±1.161 for CCB's and 31.00±0.529 for ARB'S . The obtained values showing

that mean difference for CCB is less when compared with ARB's with a P-Value of 0.0124 at 95% confidence interval(<0.05) as it indicates that both drugs are considered to be extremely statistically significant.

Table5.6: Average value of Diastolic Blood pressure for two different drugs

	CCB'S			ARB'S			P-Value
Parameter	Baseline	End point	Mean difference	Baseline	Endpoint	Mean difference	
BP	84.17± 4.62	67.25± 5.93	16.92± 0.724	84.67± 4.77	65.67± 4.82	19.00± 0.501	0.0198

The above table indicates the mean values of systolic blood pressure for different drugs which includes calcium channel blockers and angiotensin receptor blockers and their mean differences followed as 16.92±0.724 for CCB's and 19.00±0.501 for ARB'S . The obtained values showing that mean difference for CCB is less when compared with ARB's with a P-Value of 0.0198 at 95% confidence interval(<0.05) as it indicates that both drugs are considered to be extremely statistically significant.

Table 5.7: Average value of Triglycerides for two different drugs

	CCB'S			ARB'S			
Parameter	Baseline	End point	Mean difference	Baseline	Endpoint	Mean difference	P-Value
Triglycerides	166.77± 1.87	163.12± 1.55	3.65± 0.302	167.90± 3.69	163.08± 1.71	4.82±0.487	0.0489

The above table indicates the mean values of systolic blood pressure for different drugs which includes calcium channel blockers and angiotensin receptor blockers and their mean differences followed as3.65±0.302 for CCB's & 4.82±0.487 for ARB'S. The obtained values showing that mean difference for CCB is less when compared with ARB's with a P-Value of 0.0482 at 95% confidence interval(<0.05) as it indicates that both drugs are considered to be extremely statistically significant.

Table 5.8: Average value of End diastolic dimension (EDD) for two different drugs

	CCB'S			ARB'S			
Parameter	Baseline	End point	Mean difference	Baseline	Endpoint	Mean difference	P-Value
EDD	5.68± 0.124	5.27± 0.162	0.412± 0.024	5.798± 0.203	5.29± 0.156	0.508±0.032	0.0267

The above table indicates the mean values of systolic blood pressure for different drugs which includes calcium channel blockers and angiotensin receptor blockers and their mean differences followed as 0.412±0.024for CCB's 0.508±0.032for ARB'S . The obtained values showing that mean difference for CCB is less when compared with ARB's with a P-Value of 0.0267 at 95% confidence interval(<0.05) as it indicates that both drugs are considered to be extremely statistically significant.

Table 5.9: Average value of End systolic dimension (ESD) for two different drugs

	CCB'S			ARB'S			P-Value
Parameter	Baseline	End point	Mean difference	Baseline	Endpoint	Mean difference	
ESD	4.692 ± 0.134	2.588± 0.490	2.103± 0.064	4.693±0. 132	2.422± 0.212	2.270± 0.033	0.02 21

The above Figure indicates the mean values of systolic blood pressure for different drugs which includes calcium channel blockers and angiotensin receptor blockers and their mean differences followed as 2.103±0.064for CCB's 2.270±0.033 for ARB'S. The obtained values showing that mean difference for CCB is less when compared with ARB's with a P-Value of 0.0221at 95% confidence interval(<0.05) as it indicates that both drugs are considered to be extremely statistically significant.

Table 6.0: Average value of Ejection fraction for two different drugs.

	CCB'S			ARB'S			
Parameter	Baseline	End point	Mean difference	Baseline	Endpoint	Mean difference	P-Value
Ejection fraction	57.02± 1.26	53.27± 1.30	3.75± 0.201	65.12± 2.52	60.38± 2.82	4.73± 0.323	0.0112

The above Figure indicates the mean values of systolic blood pressure for different drugs which includes calcium channel blockers and angiotensin receptor blockers and their mean differences followed as 3.75±0.2.01for CCB's4.73±0.323 for ARB'S . The obtained values showing that mean difference for CCB is less when compared with ARB's with a P-Value of 0.0112at 95% confidence interval(<0.05) as it indicates that both drugs are considered to be extremely statistically significant.

Table6.1: Average value of fraction shortening for two different drugs.

	CCB'S			ARB'S			
Parameter	Baseline	End point	Mean difference	Baseline	Endpoint	Mean difference	P-Value
FS	22.10± 3.69	25.15± 4.28	3.05± 0.727	22.6± 2.9	27.9± 5.28	5.288± 0.847	0.0435

The above Figure indicates the mean values of systolic blood pressure for different drugs which includes calcium channel blockers and angiotensin receptor blockers and their mean differences followed as 3.05±0.727for CCB's 5.288±0.847 for ARB'S. The obtained values showing that mean difference for CCB is less when compared with ARB's with a P-Value of 0.0435 at 95% confidence interval(<0.05) as it indicates that both drugs are considered to be extremely statistically significant.

Table: Average value of E/A for two different drugs

CCB'S				ARB'S			
Parameter	Baseline	End point	Mean difference	Baseline	Endpoint	Mean difference	P-Value
E/A ratio	0.683± 0.140	0.447± 0.105	0.237± 0.020	1.052± 0.301	0.717± 0.132	0.335± 0.044	0.0449

The above table indicates the mean values of systolic blood pressure for different drugs which includes calcium channel blockers and angiotensin receptor blockers and their mean differences followed as 0.237±0.020for CCB's 0.335±0.044 for ARB'S. The obtained values showing that mean difference for CCB is less when compared with ARB's with a P-Value of 0.0449 at 95% confidence interval(<0.05) as it indicates that both drugs are considered to be extremely statistically significant.

Table: Average value of Sodium for two different drugs.

CCB'S				ARB'S			P-Value
Parameter	Baseline	End point	Mean difference	Baseline	Endpoint	Mean difference	
Sodium	154.18± 0.98	149.22± 1.47	4.92±0.215	151.80±1.27	146.30± 0.74	5.49± 0.157	0.0343

The above Figure indicates the mean values of systolic blood pressure for different drugs which includes calcium channel blockers and angiotensin receptor blockers and their mean differences followed as 4.92±0.125for CCB's 5.49±0.157 for ARB'S. The obtained values showing that mean difference for CCB is less when compared with ARB's with a P-Value of 0.0343at 95% confidence interval(<0.05) as it indicates that both drugs are considered to be extremely statistically significant.

Discussion

The Objective of our present study was to assess the efficacy of antihypertensive medication mainly calcium channel blockers and angiotensin receptor blockers in general medicine department and collection of cases has been included for those who visited to the SVS hospital, Mahabubnagar. In the present study we have enclosed 120 patients who met the inclusion criteria and parameters are collected from Physical examination, 2D-Echo imaging. The drugs recorded mainly those who are prescribed with amlodipine (CCB) and telmisartan (ARB) from case reports of patients. The mean differences for CCB's and ARB's followed as EDD(0.412 and 0.508),ESD(2.103 and2.270),EF(3.75 and 4.73),triglycerides(3.65 and 4.82),FS(3.05 and 5.2881),Systolic BP(27.76 and31.00),diastolic BP(16.92 and 19.00).This study mainly demonstrates that calcium channel blockers possessing low mean difference when compared with Angiotensin receptor blockers. It indicates calcium channel blockers are useful for reduction of hypertension associated cardiovascular complications mainly left ventricular dysfunction. Hypertension is a major underlying factor for diastolic dysfunction as it induces thickening of ventricular wall to normalize wall stress and the resulting increase in LV mass termed as concentric hypertrophy. It is defined by an increased wall thickness without changes in the left ventricular dimension. Many of the patients with heart failure and preserved ejection have evidence of LV hypertrophy on echocardiography, consequently LV hypertrophy affects the passive portion of the pressure-volume relationship, reducing atrio-ventricular pressure gradient. It leads to the left ventricular compliance and left ventricular filling causes left ventricular dysfunction and blood pressure control is necessary in the treatment of hypertension which should be treated by the antihypertensive medication as they mainly associated with structural alterations of the LV Hypertrophy and LV diastolic dysfunction. Previous experimental studies shows that administration of calcium channel blockers, if intiated at the early stage of left ventricular dysfunction, they mainly prevents LV relaxation abnormality and myocardial stiffening. The amilodipine based regimen significantly reduces the LV mass index as mainly acts through the slowing of LV Relaxation and lack of restoring forces leads to reductions

in velocities of LV lengthening and reduces the decay rate of LV pressure during isovolumic relaxation time. Some of the clinical trials show that Peripheral administration of calcium channel blockers mainly amilodipine shows action on the central nervous system which lowers sympathetic nerve activity and thereby reducing the BP by a complimentary mechanism to direct arteriolar vasodilation. Inspite of recent progress in the treatment of hypertension according to a number of clinical trials in previous experiments, the management of the LV diastolic dysfunction is frequently associated with hypertension remains to be established. This clinical study will contribute to better drug choice in the treatment of hypertension associated cardiovascular complications.

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