



## Comparative Study of Amlodipine with Losartan and Amlodipine with Lisinopril in Control of Blood Pressure

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### ABSTRACT

This was a comparative study, spanning over a period of two years on 100 selected hypertensive patients who satisfied certain inclusion and exclusion criteria. The study was carried out in Indira Gandhi Institute of Cardiology, Patna, India to compare the therapeutic efficacy of combination antihypertensive agents i.e. Amlodipine (5mg) with Lisinopril (10mg) and Amlodipine (5mg) with Losartan (50mg). All the patients were followed up regularly at an interval of one month for clinical history, drug compliance, and relevant physical examination and biochemical parameters. After treatment for two years it was observed that Amlodipine with Losartan combination is better than Amlodipine with Lisinopril combination in control of blood pressure. Also, the former group reported lesser adverse effects like cough and ankle edema.

**Keywords:** Hypertension, Amlodipine, Losartan, Lisinopril.

### INTRODUCTION

Hypertension is a major public health problem. A recent estimate suggests that approximately 1 billion adults have hypertension.<sup>1</sup>

It markedly increases the risk of heart failure, myocardial infarction, stroke, end stage renal disease and is the most important modifiable risk factor for cardiovascular disease. It occurs in isolation in less than 20% of cases and usually clusters with obesity, insulin resistance glucose intolerance, and dyslipidemia. Consequently, the combination of modest degrees of hypertension with other risk factors such as hyperlipidemia, diabetes, smoking and obesity is prevalent and markedly increases the risk.<sup>2</sup> There is a broader tendency for a progressive rise in the prevalence of hypertension in economically developing countries. Given that more than 80% of the world's population lives in economically developing nations, it is very likely that the world wide burden of illness due to hypertension will continue to escalate unless measures are taken to blunt the expected increase in the prevalence of hypertension.<sup>3</sup>

Epidemiological studies show that hypertension is present in 25% urban and 10% rural subjects in India. Recent studies using revised criteria (BP 140/90 mmHg) have shown a high prevalence of hypertension among urban adults.<sup>4</sup> So the population based cost effective hypertension control strategies should be developed.<sup>5</sup>

Current guidelines (JNC7) advocate treatment to a blood pressure level below 140/90 mmHg for all patients, with lower targets for patients with diabetes or renal disease (130/80 mmHg).<sup>6</sup> For individuals between 40-70 years of

age, each increment of 20 mmHg in Systolic BP (SBP) or 10 mmHg in diastolic BP (DBP) doubles the risk of cardiovascular disease across the entire BP range from 115/75 to 185/115 mmHg.<sup>7</sup>

In the majority of patients, controlling systolic hypertension, which is a more important cardiovascular disease risk factor than diastolic blood pressure except in patients younger than 50 years of age.<sup>8</sup> Recent clinical trials have demonstrated that effective BP control can be achieved in most patients who are hypertensive, but the majority would require two or more antihypertensive drugs.<sup>9</sup>

### MATERIALS AND METHODS

#### Study Design

The study was designed as a comparative study of Amlodipine in combination with lisinopril and Amlodipine in combination with losartan on control of blood pressure (BP). BP < 140/90 mmHg was taken as therapeutic goal.

#### Place and Time

This study was conducted in Indira Gandhi Institute of Cardiology, Patna.

This study was carried out from June 2005 to June 2007

#### Approval

This study has been approved by Institutional Ethics Committee, PMCH, Patna.

#### Subject

The subject included were healthy volunteers with elevated blood pressure (140/90-179/109mmHg). Both



genders were included in the study. These volunteers met the inclusion criteria of elevated B.P. and were willing to participate in the study. Written informed consent was obtained from participants. Total number of participants was 100.

#### Inclusion Criteria

1. Age 40-70 years.
2. No history of cardiovascular event.
3. Blood pressure level in the range of 140/90mmHg-179/109mmHg.

#### Exclusion Criteria

1. Cigarette smokers.
2. Family history of premature coronary heart disease.
3. Diabetes mellitus.
4. Pregnancy.
5. Hypercholesterolemia and recent or ongoing therapy with lipid lowering drugs, like clofibrate or statins.
6. Any major illness in the last 3 months, like any kidney, liver disease, Tuberculosis etc. Clinical evaluation.

All subjects were subjected to following clinical protocol.

1. A detailed history including
  - i. Name and Address
  - ii. Age (years)
  - iii. Sex
  - iv. Smoking history
  - v. Family history - particularly for congenital heart disease.
2. A thorough scrutiny of available medical records.
3. A biochemical work up including fasting Blood glucose (FBG), lipid profile.

#### Treatment method

There are 2 groups of patients each consists of 50 patients: (1) Group A, (2) Group B. Group A patients were treated by Amlodipine (5mg) with lisinopril (10mg)

combination once daily. Group B patients were treated by Amlodipine (5mg) with losartan (50mg) combination once daily.

#### Patient Management

- (a) Follow up visits are taken once a month.
- (b) The clinical history compliance, weight and blood pressure were reviewed.
- (c) Biochemical lipid profiles were obtained.

The results obtained were tabulated and analyzed.

#### RESULTS

The observations of the data, which were obtained from the study for the analysis of effect of Amlodipine combination with lisinopril and Amlodipine combination with losartan on B.P control in Group A and Group B are as follows.

In our study, out of total 100 cases mild hypertensive cases were 46 (46%) whereas moderate hypertensive cases were 54 (54%). Maximum numbers of mild hypertensive as well as moderate hypertensive cases were in the 56-60 years of age group (12 and 16 respectively) (table 1).

In this study group (Group-A) the total number of cases of mild and moderate hypertension was 50. All group-A patient were treated by Amlodipine 5mg and Lisinopril 10 mg combination once a day (table 2).

In this study 20 cases of mild hypertension out of 23 cases achieved the goal (BP<140/90mmHg) and 20 cases of moderate hypertension out of 27 cases achieved the same goal after treatment with Amlodipine 5mg and Lisinopril 10mg combination once a day (table 3).

In this study group (Group-B) the total number of cases of mild and moderate hypertension was 50. All Group-B patients were treated by Amlodipine 5mg and Losartan 50mg once a day (table 4).

In this study 22 cases of mild hypertension out of 23 cases achieved the goal (B.P<140/90) and 22 cases of moderate hypertension out of 27 cases achieved the same (table 5).

**Table 1:** Number of mild and moderate hypertensive cases in different age groups

Age group (in years)	Number of mild hypertensive cases B.P 140-159 mm Hg 90-99	Number of moderate hypertensive cases B.P 160-179 mm Hg 100-109	Total
40-45	4	2	6
46-50	8	6	14
51-55	10	10	20
56-60	12	16	28
61-65	8	14	22
66-70	4	6	10
Total	46	54	100



**Table 2:** Number of mild and moderate hypertensive cases of different age groups of (group-A)

Age groups (in years)	Number of mild hypertensive cases B.P 140-159 mm Hg 90-99	Number of moderate hypertensive cases B.P 160-179 mm Hg 100-109	Total
40-45	2	1	3
46-50	4	3	7
51-55	5	5	10
56-60	6	8	14
61-65	4	7	11
66-70	2	3	5
Total	23	27	50

**Table 3:** Number of mild and moderate hypertensive cases in different age groups of group-a who achieved the goal (i.e. B.P <140/90 mm Hg) after treatment with amlodipine 5 mg and lisinopril 10 mg combination.

Age Groups	No. of mild hypertensive cases which achieve the goal (B.P<140/90mmHg)	No of moderate hypertensive cases which achieve the goal (B.P<140/90mmHg)	Total no. of cases who achieve the goal.
40-45	2	1	3
46-50	4	2	6
51-55	4	4	8
56-60	5	6	11
61-65	3	5	8
66-70	2	2	4
Total	20	20	40

**Table 4:** Number of mild and moderate hypertensive cases in different age groups of group-B patient

Age groups in years	Number of mild hypertensive cases B.P 140-159 mm Hg 90-99	Number of moderate hypertensive cases B.P 160-179 mm Hg 100-109	Total
40-45	2	1	3
46-50	4	3	7
51-55	5	5	10
56-60	6	8	14
61-65	4	7	11
66-70	2	3	5
Total	23	27	50

**Table 5:** Number of mild and moderate hypertensive cases in different age groups of group-B which achieve the goal (i.e. B.P. <140/90 mm/Hg) after treatment with amlodipine (5 mg) and losartan (50 mg) combination

Age groups (in years)	No of mild hypertensive which achieve the goal	No of moderate hypertensive which achieve the goal	Total
40-45	2	1	3
46-50	4	2	6
51-55	5	4	9
56-60	6	6	12
61-65	3	6	9
66-70	2	3	5
Total	22	22	44

## DISCUSSION

The present study was undertaken to establish the efficacy of Amlodipine with Lisinopril and Amlodipine with Losartan in reducing blood pressure in hypertensive patients. Mild and moderate hypertension patients of

both sexes were selected in this study. Blood pressure in a population is distributed continuously as a bell shaped curve, a concept that was first formulated by Sir George Peckering. Patient distribution in our report is similar to that of Sir George Peckering.



Hypertension is more prevalent in males. Out of the 100 patients 56 were males (56%) and 44 were females (44%) and also the prevalence of hypertension in female is substantially less than in age matched males up to 65 years of age but after 65 years of age the prevalence of hypertension become almost equal in both sex. This finding is in corroboration with Harrison's principles of Internal Medicine.<sup>10</sup>

Each study group contains equal number of mild and moderate hypertensive patients. These 2 groups are called Group A and Group B each containing 50 patients. Group A patient were treated by Amlodipine (5 mg) plus lisinopril (10 mg) combination once a day. Group B patients were treated by Amlodipine (5 mg) plus losartan (50 mg) combination once a day. These combinations of drugs were chosen in this study because these combination attacks both the renin-angiotensin system and the increased peripheral vascular resistance. There may be specific renal benefits, because all these drugs (i.e. Amlodipine, Lisinopril and Losartan) delay the diabetic and non diabetic nephropathy. The angiotensin converting enzyme (ACE) inhibitor reduces the ankle edema of the DHPs and the latter reduces the cough of the ACE inhibitor. Both types of agents are free of metabolic and central nervous system side effect.

According to the book "Drugs for the heart", ACE inhibitors plus CCBs are now increasingly used in the therapy of hypertension.<sup>11</sup> In addition to BP lowering, the overall evidence is that these agents also confer vascular protection, especially in diabetic individuals and in renal disease. ACE inhibitors combine well with diuretics and CCBs and have relatively infrequent side effects. Angiotensin receptor blockers (like Losartan) have an excellent record in comparative studies showing better cardiovascular outcome benefit, virtually without the major side effects of ACE inhibitors and provide symptoms free control of hypertension.<sup>12</sup>

After 2 years treatment of Group A patient by Amlodipine and lisinopril combination, 87% (20 cases out of 23) of mild hypertension cases achieved the goal (B.P. < 140/90 mmHg) and 74% (20 cases out of 27) of moderate hypertension cases achieved the goal as shown in table 3.

In case of Group B patients treated with Amlodipine and Losartan combination 96% (22 cases out of 23) of mild hypertension cases achieved the goal and 81% (22 cases out of 27) of moderate hypertension cases achieved the goal after 2 years treatment.

This study shows that in Group A patients who were treated by Amlodipine + Lisinopril combination 40 out of 50 cases (80%) achieved the goal and Group B patient who were treated by Amlodipine + Losartan combination 44 out of 50 cases (88%) achieved the goal.

According to "The Pharmacological basis of therapeutics", ninety percent of patients with mild to moderate hypertension can be controlled by the combination of an ACE inhibitor with either a calcium channel blocker,

adrenergic receptor blocker or a diuretic.<sup>13</sup> This report is similar to our study report that the 80% of patients of group A and 88% of patients of group B achieved the goal.

On the basis of this study the combination of Amlodipine and losartan is better than the combination of Amlodipine and lisinopril because it controls B.P. more effectively.

## CONCLUSION

Both the combination of Amlodipine with lisinopril and Amlodipine with losartan is effective for mild and moderate hypertension. By Amlodipine and lisinopril combination 80% of hypertensive patient achieve the goal (<140/90 mmHg) whereas by Amlodipine and losartan combination 88% of hypertensive patients achieve the goal (<140/90 mmHg). So the Amlodipine and losartan combination is better than the Amlodipine and lisinopril combination because it controls blood pressure in more number of patients.

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