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**RESEARCH ARTICLE**

## **A Prospective Study on Combinational Drug Efficacy in Hypertensive Patients**

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**ABSTRACT:**

**AIM AND OBJECTIVES :** The main aim of this study is to evaluate the combination drug efficacy in hypertensive patients and also reduction of blood pressure by using combination drugs.

**METHODS AND MATERIALS:** This study which includes prospective monitoring of hypertensive patients who are taking different type of combination drugs to reduce blood pressure. This is prospective study done in hypertensive patients. The statistical method used in the study is student t test.

**RESULTS :** Totally 100 patients were included in the study. Three month readings were taken. 1<sup>st</sup> month reading is taken as initial value and 3<sup>rd</sup> month reading is taken as final value. The baseline blood pressure was reduced from 171.2±3.2 to 137.1±2.6 in systolic blood pressure where as diastolic blood is reduced from 101.20±3.2 to 87.10±2.6 of patients using group D. The other group combinations also have slight changes in the reduction of blood pressure. The combination therapy shows greater efficacy in hypertensive patients.

**CONCLUSION:** The percentage reduction of blood pressure after using group D was more than compared with other combinations. This study concludes that combination drugs shows efficacy in hypertensive patients.

**KEYWORDS:** Atenolol +enalapril, telmisartan+perindopril, hypertension.

**INTRODUCTION:**

Hypertension is a multisystem disorder in which many interrelated factors contribute to elevate blood pressure. Hypertension is defined as elevation of blood pressure and blood pressure is also acts against on wall of arteries by the force of blood<sup>1</sup>. It has two components one is systolic pressure which is the force of blood that exerts on the artery walls when the heart is pumping and second one is diastolic pressure is the residual force that occur when the heart beat relax between beats. Blood pressure changes from ages and also from person to person. It rises and falls during the day depending on the physical activity, social life, stress and emotions<sup>2</sup>.

80% percent of the world population are living in developing countries are the most of the world burden of hypertension exists. By 2025 three quarters of people with hypertension are living in developing countries. The trend associated with an increase in the number of anti hypertensive medications prescribed it is because of achieving blood pressure control is highly cost effective and also patients with diabetes it is cost saving. Most patients with hypertension requires multiple therapy<sup>3</sup>.

**Why we need multiple medications?**

There are many medications that are used in combination to help control high blood pressure. Control hypertension can lower the risk of heart diseases. Combination treatment means another class of blood pressure is added to the first drug to increase the effectiveness.

To reach target blood pressure as per the current management guidelines, majority of patients require two or more anti hypertensive drugs simultaneously. The

patients who require multiple drug therapy is variable, depending upon the clinical factors including population demographics, the average level of baseline blood pressure, and the prevalence of comorbid conditions that influence both therapeutic agents e.g., diabetes and response to administered agents e.g., obesity<sup>4</sup>.

The requirement of any combination is to reduce blood pressure to a greater extent than monotherapy. The blood pressure reducing ability of any individual agents varies by only few mmHg, the effect of combinations varies considerably<sup>5</sup>.

### **Combinations of antihypertensive drug classes:**

#### **ACE inhibitors and Beta blockers:**

Angiotensin converting enzyme converts angiotensin I produced by the body to angiotensin II in the blood. Angiotensin II is a very potent chemical that causes the muscles surrounding blood vessels to contract and narrow the blood vessels. By reducing the activity of ACE, ACE inhibitors decrease the formation of angiotensin II which leads to dilation of blood vessels, and thereby reduces blood pressure<sup>6</sup>.

Beta blockers also called beta-adrenoreceptor blocking agents, these medications bind to beta receptors present on the cells of the heart, arteries, kidneys and other tissues that are stimulated by the stress hormones (e.g. adrenaline and noradrenaline). The two main beta receptors that are targeted by beta blockers are the beta 1 receptor and the beta 2 receptor. A large number of beta 1 receptors are present on the heart and kidney cells, while the beta 2 receptor is the predominant regulator of vascular and nonvascular smooth muscles. Beta 1 receptors are present on the sino-atrial node, which is responsible for generating the impulses that make the heart beat. Blocking the sino-atrial node therefore reduces heart rate.

The combination of ACE inhibitor and beta blockers are more effective than monotherapy. Many studies have shown that beta blockers are more when they are used along ACE inhibitors<sup>7</sup>.

Examples : atenolol and enalapril

#### **ACE inhibitors and calcium channel blockers:**

ACE inhibitors are often used in people who have diabetes or heart disease. They help lower blood pressure by inhibiting the production of angiotensin in the body. Angiotensin is a hormone that causes blood vessels to constrict which can lead to increased blood pressure<sup>8</sup>. Calcium channel blockers prevent calcium from entering cells of the heart and blood vessel walls, resulting in lower blood pressure.

Calcium channel blockers, also called calcium

antagonists, relax and widen blood vessels by affecting the muscle cells in the arterial walls<sup>9</sup>.

The combination that results in vasodilation of the arteries, a reduction in heart contraction force, a slowing of heart rate and a reduction in aldosterone production. These effects cause a decrease in blood pressure in the hypertensive patient and a decrease in symptoms in patients with angina or ischemic heart disease<sup>10</sup>.

Example: amlodipine and enalapril, amlodipine and perindopril

### **MATERIALS AND METHODS:**

The present study was conducted in ESI hospital, ayanavaram, Chennai. It is a government hospital consists of all departments i.e., general medicine, orthopaedics, surgery, gynecology, paediatrics, psychiatric.

The study is a prospective, single centered observational study and it includes 100 patients who are diagnosed with hypertension of age 20-80 in both males and females. The patients are selected initially the diagnosis of hypertension by the physicians. The blood pressure reading was done for the patients using sphygmomanometer.

The duration of the study is 10 months. The statistical analysis used for the study is regression analysis and one way ANOVA test. The statistical analysis was done after all the data was obtained. The complete data was collected from the patients and it is documented in a proforma.

In this study, data were recorded in a proforma. The proforma consists of patient details(age, sex, weight, BMI, IP number, social history, family history, past medical history), general examination. Lab investigations, blood pressure chart and drug chart for hypertensive patients.

#### **INCLUSION CRITERIA:**

- All the inpatient of either sex of age above 18 years for undergoing treatment in the hospital
- Patients with past medical and medication histories

#### **EXCLUSION CRITERIA:**

- Patients those who are admitted in surgery ward and intensive care department.
- Patients with known surgical histories.
- Pregnant woman.
- Patients diagnosed with Chronic kidney disease.
- Patients diagnosed with Congestive heart failure.

**RESULTS AND DISCUSSION:**

The study was conducted to find out the combination drug efficacy in hypertension patients. Total 100 cases were collected. Total 3 months readings were taken, first month reading is taken as initial value and 3<sup>rd</sup> month reading is taken as final value.

**Table 1 shows age wise distribution among the patients**

AGE	No. of patients(n=100)	Percentage(%)
20-29	11	11%
30-39	26	26%
40-49	33	33%
50-59	22	22%
60-69	6	6%
70-80	2	2%

Out of selected 100 patients, 11 patients were in the age group of 20-29 years, 26 patients were in the age group of 30-39 years, 33 patients were in the age group of 40-49 years, 22 patients were in the age group of 50-59 years, 6 patients were in the age group of 60-69 years, 2 patients were in the age group of 70-80 years. According to this data 40-49 years age group people were mostly affected.

**Table 2 shows Gender wise distribution among the patients**

Gender	No. of patients(n=100)	Percentage (%)
Male	68	68%
Female	32	32%

Out of selected 100 patients, 68 patients are male and 32 patients are female. According to this data male patients were mostly diagnosed with hypertension.

**Table 3 shows BMI wise distribution**

BMI	No. of patients(n=100)	Percentage(%)
<18	53	53%
19-25	28	28%
>25	19	19%

According to BMI, 53 patients were in normal range, 28 patients were in over weight and 19 patients were in obesity. This is indicating that BMI is also one of the risk factor in hypertension patients.

**Table 4 shows personal habits male (n=100)**

Personal habits	No. of patients(n=100)	Percentage (%)
Smoker	9	9%
Alcoholic	17	17%
Smoker and alcoholic	29	29%
Non smoker and non alcoholic	45	45%

According to personal habits in male, 9 (13%) patients were only smokers, 17(25%) were only alcoholics, 29 (42%) patients were smokers and alcoholics and 13(19%) aware non smokers and non alcoholics. According to this data smoking and alcohol habitual patients were mostly suffered by hypertension.

**Table 9 shows systolic blood pressure**

parameter	Group A	Group B	Group C	Group D	P value
Initial	171.20±3.20	181.17±1.60	166.2±2.10	172.40±3.10	0.2172
Final	137.10±2.60	127.60±1.72	141±2.00	121±2.16	0.2042
P value	0.0345	0.0435*	0.0242	0.0479 **	

**Table 5 shows food habits**

Food habits	No. of patients (n=100)	Percentage(%)
Veg	39	39%
Non veg	61	61%

Among selected 100 patients, 39 patients were only vegetarian and 61 patients were non vegetarian. According to this data, non vegetarian patients were more affected by hypertension.

**Table 6 shows family history**

Family history	No. of patients (n=100)	Percentage (%)
Yes	54	54%
No	46	46%

Among 100 patients, 54 patients were having family history and 46 patients were not having family history, according to this data family history is also one of the risk factor in hypertension patients.

**Table 7 shows comorbidities in patients**

Comorbidities	No. of patients(n=100)	Percentage(%)
Diabetes mellitus	55	55%
Hypothyroidism	16	16%
Myocardial infarction/	10	10%
Rheumatoid arthritis	6	6%
COPD	9	9%
Asthma	11	11%
Patients not having any comorbidities	15	15%

This study shows that hypertension is associated with some other diseases, 55 patients were only with diabetes mellitus, 16 patients were only with hypothyroidism, 10 patients were only with myocardial infarction, 6 patients were only with rheumatoid arthritis, 9 patients were only with COPD, 11 patients were asthma. According to this data, most of the hypertension patients are associated with diabetes mellitus and also hypothyroidism.

**Table 8 shows combination drugs used in the study**

Group	Combination drugs	No. of patients (n=100)	Percentage (%)
Group A	Atenolol and Enalapril	23	23%
Group B	Telmisartan and perindopril	27	27%
Group C	Amolodipine and enalapril	26	26%
Group D	Amolodipine+indipamine and perindopril	24	24%

In hypertension most of patients were treated with combinational drugs. In this study different combinations were seen. From the above data telmisartan and perindopril combination were given mostly.

**Table 10 shows monthly systolic blood pressure**

Group	Zero month	1 <sup>st</sup> month	2 <sup>nd</sup> month	3 <sup>rd</sup> month	P value
Group A	171.2±3.2	156.12±2.0	141.2±1.16	137.1±2.60	0.0345
Group B	181.17±1.6	163.27±2.6	145.29±1.2	127.6±1.72	0.0435*
Group C	166.2±2.10	151.27±1.6	144.27±1.2	141±2.6	0.0242
Group D	172.4±3.10	155.23±1.2	133.27±2.0	121±2.16	0.0479**

**Table 11 shows diastolic blood pressure**

parameter	Group A	Group B	Group C	Group D	P value
Initial	101.20±3.20	97.2±6.11	101.6±2.7	93.16±2.18	0.0621
Final	87.10±2.60	84±2.7	81±3.2	86±1.2	0.3217
P value	0.0369	0.0403*	0.0212	0.0432 **	

**Table 12 shows monthly diastolic blood pressure**

Group	Zero month	1 <sup>st</sup> month	2 <sup>nd</sup> month	3 <sup>rd</sup> month	P value
Group A	101.20±3.2	99.10±1.6	90.20±1.6	87.10±2.6	0.0369
Group B	97.2±6.11	94.3±1.3	88.23±1.2	84±2.7	0.0403*
Group C	101.6±2.7	95.2±1.3	85.2±2.3	81±3.2	0.0212
Group D	93.66±2.18	91.3±2.3	88.2±2.1	86±1.2	0.0432**

Table 9 and table 10 shows all combinations shows significance but group D shows much effective than other groups.

Table 11 and table 12 shows all combinations shows significance but group D shows much effective than other groups.

Patients receiving atenolol +enalapril and amlodipine+enalapril were shows significant difference in three months. Patients taking group A the percentage of reduction of BP was 10% and 15 %. These two group shows significant reduction in blood pressure (table 9 and table 11).

**CONCLUSION:**

Most of the population i.e., 80% of the population are with hypertension. Mostly patients were treated with combination therapy to reduce blood pressure. Combination therapy will be given when blood pressure does not reduce with mono therapy.

This study shows all the combination drugs reduced the systolic as well as diastolic significantly. In this study group D was mostly used.

The percentage reduction of both systolic as well as diastolic in the hypertension patients, was more in Group D. The combination therapy shows much efficacy in hypertensive patients. Group D combination shows much reduction in BP as well as Group B combination reduces blood pressure.

The study concludes that combination drug shows efficacy in hypertension patients. Suggesting that group D were effectively shows reduction in blood pressure.

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