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Comparative Study of Antihypertensive Drugs At Tertiary Care Hospital

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ABSTRACT

Hypertension is the most important risk factor for cardio vascular disease. But, the key question remains: which of the many available types of blood pressure lowering drugs is the better choice as first line medication. Hence, the prospective, randomized, single blind , Comparative study was conducted at tertiary care Hospital to assess the beneficial outcomes of drugs by comparative method. The study concludes that the physicians were prescribed the ACEIs for hypertension with various co morbidities as per JNC-7 guidelines. The study conclude that the A+E+N is the most effective combination therapy for better control of hypertension. The study indicates that the combination therapy can be individualized according to the presence of co morbidities with HTN.

Keywords: Hypertension, Comparative study, co morbidities, combination therapy.

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INTRODUCTION

Cardiovascular diseases are a major public health problems indicates 10% of the global burden of diseases. Epidemiological studies show that 33% of patients death are rised by cardio vascular diseases ¹. The question was answered with many clinical trials and systematic reviews. But, there was controversy remains about the therapeutic effectiveness of the each class of drugs. Systematic reviews and controlled trials compare that difference in effectiveness and choice of effective drugs. But, direct comparative studies are not carried out for many drug classes. ²

Hence, there was a urgent need for a broad systematic review of various interventions for primary prevention of cardio vascular disease. ³ Hence, the study aimed to update the effectiveness of antihypertensive drugs for the initiation of treatment to achieve goal blood pressure. The present study was conducted to evaluate antihypertensive efficacy of Atenolol and Nefidepine in patients with essential hypertension in tertiary care hospital

MATERIALS AND METHOD

The prospective, randomized, single blind, Comparative study was conducted with 250 patients for 6 months duration with the aim of to compare the efficacy and tolerability of different antihypertensive drugs in patients with Hypertension. The data were collected at baseline assessment and Compliance was assessed by interview and pill count. If any adverse effect noted for evaluation. All the collected data were entered in Excel sheet. And SPSS was used for the statistical analysis. The effect of individual drugs on BP in relation to baseline was statistically analyzed by using paired students T-test. P-value ≤ 0.05 was considered as statistically significant.

RESULTS AND DISCUSSION

Antihypertensive drugs are prescribed to the patients depending on their elevated blood pressure. It may either Monotherapy or combination therapy in two drugs and three drugs combinations. The drugs included in the study were tablet Atenolol(A), average of 30 mg/day orally and tablet Nifedepine (N) 10mg/day once daily. Drugs used in Monotherapy included Atenolol and Nefidepine while in combination therapy included Enlapril and Furosemide like A+E, A+F, A+N, N+F and 3 drugs combination like A+E+F, A+E+N, A+N+F combination were prescribed.

The effectiveness of the drugs are evaluated by measure BP after every month. The procedure was repeated for upto completion of study. Patients response to ongoing treatment was checked by evaluating BP. Patients baseline ECG and biochemical tests are repeated. Patients compliance was assessed and result was given in table -1

Table 1: Assessment of patient compliance.

S.No	Compliance	no. of Patients	% of Patients
1	Taking the drug properly	180	72
2	Forgot to take the drug	25	01
3	Missed the drug	15	0.6
4	Not interested to take drug	10	0.4
5	Double the drug	06	2.4
6	Incorrect Pill count	14	5.6

Effect on systolic blood pressure:

A significant decrease in mean SBP was achieved both Atenolol and Nefedipine monotherapy. P-Value ≤ 0.001 indicates that there was an highly significant reduction in combination therapy worth A+E, E+N,E+F , A+E+F, A+E+N, E+N+F. and the report was given in table-2.

Table 2: Effect of Drugs on Systolic Blood Pressure(n=250)

Drugs	Systolic BP(mmHg)		Decrease in SBP(mmHg)	% decrease in SBP	95% confidence interval		P -value
	Baseline	After treatment			Baseline	After treatment	
A (n=25)	150.8+12.6	129.5+12.0	21.2+10.0	14.1	146.9-154.6	125.8-133.2	<0.001
N(n=22)	162.3+27.6	131.9+13.1	30.4+25.7	18.8	153.7-170.9	127.8-136.0	<0.001
A+E(n=32)	162.7+21.4	137.2+17.9	25.7+17.2	15.8	157.4-168.1	132.7-141.6	<0.001
E+F (n=18)	154.4+14.4	127.4+11.9	27.0+17.5	17.5	149.4-159.4	123.2-131.5	<0.001
E+N(n=15)	153.3+15.0	135.6+14.2	17.8+12.0	11.6	141.8-164.9	124.6-146.5	<0.01
A+E+F (n=45)	166.3+19.2	130.0+21.4	36.2+19.2	21.8	150.2-182.3	112.1-147.9	<0.01
A+E+N(n=47)	173.3+20.6	134.2+16.8	25.7+17.2	29.2	160.2-186.4	123.5-144.8	<0.001
E+N+F(n=46)	160.0+23.4	140.0+19.0	39.2+22.3	12.1	147.9-172.1	130.2-149.8	<0.001

A=Atenolol, E=Enalapril, N=Nefedipine , CI= Confidence Interval, SBP = Systolic blood pressure.

Table 3 : Effect of drugs on diastolic blood Pressure(n=250).

DRUGS	Systolic BP(mmHg)		Decrease in DBP(mmHg)	% decrease in DBP	95% confidence interval		P -value
	Baseline	After treatment			Baseline	After treatment	
A (n=25)	95.6+9.7	81.4+8.2	14.4+8.5	15.1	92.6-98.6	78.8-83.8	<0.001
N(n=22)	97.4+11.9	82.8+8.6	14.5+10.4	14.9	93.6-101.1	80.2-85.6	<0.001
A+E(n=32)	99.1+10.4	85.8+9.4	13.5+8.8	13.6	96.5-101.7	88.1-88.4	<0.001
E+F (n=18)	94.4+7.9	78.5+7.8	15.8+8.9	16.8	91.7-97.2	75.8-81.3	<0.001
E+N(n=15)	95.6+14.2	84.4+5.2	11.1+3.3	16.6	91.5-91.6	80.4-88.5	<0.001
A+E+F (n=45)	98.8+9.9	85.0+9.2	13.8+7.4	13.9	90.4-107.0	77.2-92.7	<0.01
A+E+N(n=47)	99.2+10.0	87.0+9.8	16.6+13.7	12.2	94.0-104.4	82.0-92.1	<0.001
E+N+F(n=46)	97.5+5.0	82.5+5.0	15.0+5.8	15.4	89.5-105.5	74.5-90.4	<0.05

A=Atenolol, E=Enalapril, N=Nefedipine , CI= Confidence Interval, SBP = Systolic blood pressure.

Effect of drugs on diastolic blood pressure:

A highly significant decrease in mean DBP was observed in Monotherapy groups ($P \leq 0.001$). There was also highly significant decrease ($P \leq 0.001$). In A+E, E+F, A+F, A+N and A+E+F combination groups. Other combination groups shows considerable reduction with E+N, A+E+N, combinations. and the report was given in table 3.

Atenolol is used in dose of 5mg/day in 25 patients. BP of 15 patients was achieved to the targeted level of $\leq 140/90$ mmHg with this dose. But in remaining patients ($n=10$) the targeted BP was not achieved to the desired level at the duration of the study. The dose of Atenolol was increased to 10 mg/day. Out of this 10 cases, BP was controlled with 5 cases with this dose. In remaining 5 cases dose was increased to 15 mg/day. However, the average of Atenolol used was 30mg/day.

The previous studies indicated that Atenolol reduced the mean SBP by 18.2 ± 11.3 mmHg and Nefedipine by 10.0 ± 2.0 mmHg. Whereas, in our study also shows that Atenolol and Nefedipine reduced mean SBP by 12.4 ± 10.1 mmHg and 31.5 ± 24.6 mmHg respectively. Which showed more effective reduction than previous studies. Edward *et.al.* found reduction in mean SBP by 18.0 mmHg with A+N combination. Our study proved that there was a remarkable consistent with above study in reduction with 19.4 mmHg.

In the Nefedipine group, out of 22 patients respond to Nefedipine in the dose of 5 mg/kg. Whereas in 10 patients the goal BP was not achieved. Hence, the dose was increased to 10mg/day. The patients uncontrolled BP was reduced to $\leq 140/90$ mmHg. No further increase in dose of Nefedipine during the study period. The result indicates that, both Atenolol and Nefedipine produced a statistically significant ($P \leq 0.001$) and dose related fall in sitting and standing BP. Which was shown in table 4 and 5.

Table 4: Effect of Atenolol On Blood Pressure($n=25$) Sitting and Standing Position.

Visit	Sitting blood pressure		Standing blood pressure	
	SBP(Mean \pm SEM)	DBP(Mean \pm SEM)	SBP(Mean \pm SEM)	DBP(Mean \pm SEM)
0 - Week	160.00 \pm 1.86	100.30 \pm 0.62	156.35 \pm 2.02	98.60 \pm 0.64
4 - Week	158.01 \pm 1.20	98.31 \pm 0.41	150.31 \pm 2.04	95.24 \pm 0.52
8 - Week	140.08 \pm 0.9	92.29 \pm 0.51	148.29 \pm 3.01	89.48 \pm 1.21
12 - Week	136.12 \pm 1.2	81.32 \pm 0.21	130.30 \pm 3.05	83.52 \pm 0.24
16 - Week	130.24 \pm 1.19	85.20 \pm 0.58	134.10 \pm 1.16	85.12 \pm 0.64

N= Number of patients, SBP= Systolic blood pressure, DBP = diastolic blood pressure, SEM = Standard error of mean, 0-week= Baseline assessment, 4,8,12,16 Weeks = values after the therapy in respective weeks

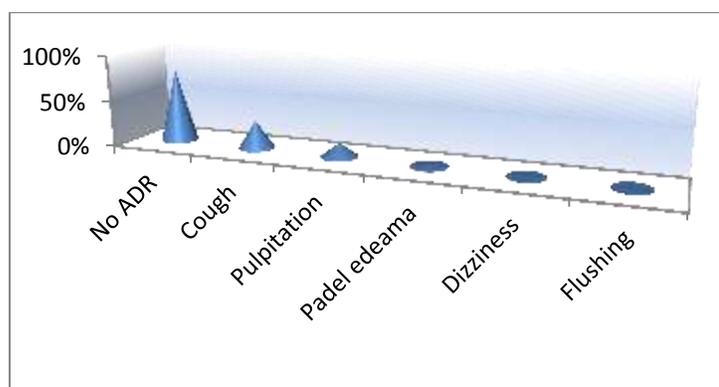
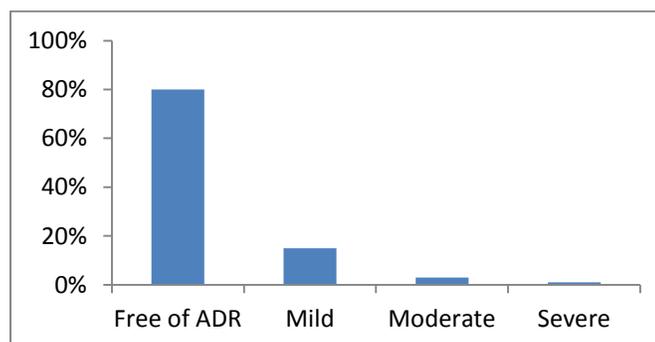
Table 5 : Effect of Nefedipine on Blood Pressure(n=25) sitting and standing position.

Visit	Sitting blood pressure		Standing blood pressure	
	SBP(Mean±SEM)	DBP(Mean±SEM)	SBP(Mean±SEM)	DBP(Mean±SEM)
0 - Week	160.15±1.58	95.09±1.24	160.90±1.70	96.81±1.10
4 - Week	154.14±2.01	93.12±1.32	154.08±1.82	94.72±1.20
8 - Week	140.21±0.98	88.13±2.01	149.21±1.01	89.82±1.34
12 - Week	138.09±1.21	83.21±0.14	142.34±1.34	81.24±1.42
16 - Week	130.90±1.30	85.65±0.82	131.65±1.40	85.75±0.82

N= Number of patients, SBP= Systolic blood pressure, DBP = diastolic blood pressure, SEM = Standard error of mean, 0-week= Baseline assessment, 4,8,12,16 Weeks = values after the therapy in respective weeks.

The adverse effects are collected and analyzed. The report was given in figure -1. 80% of the patients are not affected with any adverse effects(n=170), and 30% patients are prone to cough, 15% patients are affected with palpitation. Only 3% patients are with paddle edema. No one was affected with flushing, and skin rash.

The study report that the decrease in blood pressure is a primary outcome measures to achieve goal blood pressure 140/90mmHg. The secondary outcome measures are the safety variables including nature and severity of adverse drug reactions. The severity was classified as follows and was given in Figure -2

**Figure 1: Adverse effects of the drugs.****Figure 2: Severity of Adverse Drug Reactions**

The present study was conducted with 3 groups for evaluate the effective drugs like mono, 2 drugs, 3 drugs combination pattern. Most commonly used antihypertensive drugs are β -blockers, CCBs, ACEIs and diuretics. It also proved by R. Sivasakthi *et al.*, The drugs are used to control and manage the mild to moderate hypertension. The study was results the difference between hypertension drugs by the assessment of comparison based on efficacy and tolerability. All the drugs were effective in control the BP in considerable manner. The drugs used were prescribed as per JNC—7 guidelines. Dihydropyridine calcium antagonist(N) with β -blocker (A) are commonly used in combination therapy and the results was coincided with previous studies and various randomized clinical trials. In our study, majority of patients hypertension was managed by 3 drugs combinations. (n=138).

There was significant reduction in SBP with mean of 25.0 ± 15.4 mmHg with Enalapril and frusemide combination. Similarly, the result was showed in Nazia et.al. There was remarkable reduction in mean SBP in moderate hypertension with enalapril and a diuretic combination. The study found that Enalapril was not prescribed in Monotherapy. It may be due to intension of physicians to switch over the combination of Enalapril+Frusemide for effective control of moderate hypertension. It also confirmed by Wing et.al. and they found that the E+A combination was extremely effective when compared to enalapril alone.

Majority of peoples (n=388) were prescribed with 3 drug combination. It may to improve the management of hypertension. Previous studies were also indicated that the combination of diuretics+ BB+ACEIs were more effective. Hence, it supports to our study results. We observed that combination therapy was used for both mild and moderate hypertension. 60.2% and 38.0% respectively. Among all the groups A+N+E combination was (n=47) highly effective in reducing SBP.

CONCLUSION

The study found that combination therapy was more effective in reducing hypertension. It was majorly used in large population of patient to control BP. Two drug combinations are more effective and produce less side effect. 3 drug combination should be minimized to reduce the ADR like cough, palpitation and pedal edema. The study concludes that the physicians were prescribed the ACEIs for hypertension with various co morbidities as per JNC-7 guidelines. The study conclude that the A+E+N is the most effective combination therapy for better control of hypertension. The study indicates that the combination therapy can be individualized occurring to the presence of comorbidities with HTN. The study strongly recommends the patient counseling

in conjunction with drug therapy, decrease drug therapy , Increase intake of potassium and mild morning walk are more effective in reduction of BP. The finding of the present study indicates that Atenolol is the choice of drug for mild and moderate hypertension without any side effects.

REFERENCE:

1. Nazia Yasmeen; Efficacy and Tolerability of Different Antihypertensive Drugs in Patients with Mild to Moderate Hypertension in a Tertiary Care Hospital – A Prospective, Comparative Study; Scholars Research Library; 2011; 3 (1):436-443.
2. Yukihito Higashi; A Comparison of Angiotensin-Converting Enzyme Inhibitors, Calcium Antagonists, Beta-Blockers and Diuretic Agents on Reactive Hyperemia in Patients With Essential Hypertension: A Multicenter Study; Journal of the American College of Cardiology; 2000; 35,(2); 30-34.
3. Hitoko Ogata; Beneficial effects of beta-blockers and angiotensin-converting enzyme inhibitors in Duchenne muscular dystrophy; Journal of Cardiology ; 2009; 53; 72—78.
4. Danai tsalta; Beta-Blockers in the Treatment of Hypertension: Latest Data and Opinions; Hellenic Journal of Cardiology ; 2008; 48: 37-47,
5. Seyyed Hassan. The comparative study of Antihypertensive treatments (CSAT): backgrounds, methods, and the preliminary results (interim report); medical journal of the Islamic republic of Iran; 1996;9(4); 285 -293.
6. Ujala Verma. Antihypertensive Efficacy of Carvedilol and Amlodipine in Patients of Mild to Moderate Hypertension – A Comparative Study; journal of Jammu and Kashmir science;2004; 6(4) ; 193 -196.
7. Atle Fretheim. Comparative effectiveness of antihypertensive medication for primary prevention of cardiovascular disease: systematic review and multiple treatments meta-analysis; British Medical journal; 2012, 10(33) ; 2-14.

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