



EVALUATION OF CARDIOVASCULAR OUTCOME MANAGEMENT BY ANTI-HYPERTENSIVES

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ABSTRACT

The pathogenesis of essential hypertension is multifactorial and highly complex. Multiple factors modulate the blood pressure (BP) for adequate tissue perfusion and include humoral mediators, vascular reactivity, circulating blood volume, vascular caliber, blood viscosity, cardiac output, blood vessel elasticity, and neural stimulation. A possible pathogenesis of essential hypertension has been proposed in which multiple factors, including genetic predisposition, excess dietary salt intake, and adrenergic tone, may interact to produce hypertension. One mechanism of hypertension has been described as high-output hypertension. High output hypertension results from decreased peripheral vascular resistance and concomitant cardiac stimulation by adrenergic hyperactivity and altered calcium homeostasis. Hypertension is most prevalent in patients of age group 51-70 years. The BP and Echo (EDD, ESD, IVSD, PW, LA, and EF) results of the study concluded that the proper adherence and administration of antihypertensives is effective in normalizing the elevated BP levels and also reduced the risk of CV outcomes in most of the patients.

Keywords :- Hypertension, Therapeutic Approach, Therapeutic Outcome, Anti-Hypertensives.

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INTRODUCTION

The pathogenesis of essential hypertension is multifactorial and highly complex. Multiple factors modulate the blood pressure (BP) for adequate tissue perfusion and include humoral mediators, vascular reactivity, circulating blood volume, vascular caliber, blood viscosity, cardiac output, blood vessel elasticity, and neural stimulation. A possible pathogenesis of essential hypertension has been proposed in which multiple factors, including genetic predisposition, excess dietary salt intake, and adrenergic tone, may interact to produce hypertension. Although genetics appears to contribute to essential hypertension, the exact mechanism has not been established[1]. The natural history of essential hypertension evolves from occasional to establish hypertension. After a long invariable

asymptomatic period, persistent hypertension develops into complicated hypertension, in which end-organ damage to the aorta and small arteries, heart, kidneys, retina, and central nervous system is evident[1]. The progression of essential hypertension is as follows:-

1. Pre hypertension in persons aged 10-30 years (by increased cardiac output).
2. Early hypertension in persons aged 20 – 40 years (in which increased Peripheral resistance is prominent).
3. Established hypertension in persons aged 30 – 50 years.
4. Complicated hypertension in persons aged 40 – 60 years.

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One mechanism of hypertension has been described as high-output hypertension. High output hypertension results from decreased peripheral vascular resistance and concomitant cardiac stimulation by adrenergic hyperactivity and altered calcium homeostasis. A second mechanism manifests with normal or reduced cardiac output and elevated systematic vascular resistance due to increased vaso reactivity. Another (and overlapping) mechanism is increased salt and water reabsorption (salt sensitivity) by the kidney, which increases circulating blood volume[2]. Cortisol reactivity, an index of hypothalamic-pituitary-adrenal function, may be another mechanism by which psychosocial stress is associated with future hypertension. In a prospective sub study of the Whitehall II cohort, with 3 years follow-up of an occupational cohort in previously healthy patients, investigators reported 15.9% of the patient sample developed hypertension in response to laboratory-induced mental stressors and found an association between cortisol stress reactivity and incident hypertension[2].

EPIDEMIOLOGY OF HYPERTENSION:

Epidemiological studies demonstrate that the prevalence of hypertension is increasing rapidly among Indian urban and rural population. The various reasons for hypertension are socio economic, behavioural, sedentary lifestyle, nutritional, poor health maintenance. The poor controlling of hypertension leads to further progression cardiovascular complications like ischemic heart disease, heart failure, stroke and chronic renal insufficiency. [3]

□ National: The prevalence of hypertension in the late nineties and early twentieth century vary among different studies in India, ranged from 2-25% in urban Indian and 2-8% in rural India. [4] Review of epidemiological studies suggests that the prevalence of hypertension has increased in both urban and rural India and presently it is 25% in urban adults and 10-15% among rural adults. [4]

□ United Andhra Pradesh State (Andhra Pradesh and Telangana) 2013: The prevalence of hypertension in the state 2-32% in urban and 8-28% in the rural region and this state falls third in number for the highest recorded number of cases of hypertension in the year 2013 after Karnataka and Tamil Nadu and males are being most effected than females with 56% and 44% respectively in the urban areas and in the rural areas the females are more in the numbers than males with 52% and 48% respectively.[4]

PHARMACOLOGICAL THERAPY:

Principles of drug treatment:

The class of drugs used to treat hypertension is antihypertensives. The therapy with antihypertensives

lowers BP and also reduces the risk of cardiovascular diseases, cerebrovascular events, and death. [4-8]

The first line agents for the initiation of antihypertensive drug therapy include Thiazide Diuretics, Calcium Channel Blockers and Angiotensin Converting Enzyme Inhibitors or Angiotensin Receptor Blockers. [9] Several different strategies have to be observed for initiation of drug treatment for high B.P. The patients can be started on a single agent, but for stage 2 hypertensive patients the treatment should be started with 2 drugs of different classes. [10]

Low doses of anti-hypertensive drugs should be used to initiate therapy.

- Choice of an anti-hypertensive agent is influenced by age, concomitant risk factors, presence of target organ damage, other co-existing diseases, socioeconomic considerations, and availability of the drug and past experience of the physician.
- Combination of low doses of two or more drugs having synergistic effect is likely to produce lesser side effects. In 60-70% of patients, goal blood pressure will be achieved with two are more agents only.
- Use of fixed dose formulations should be considered to improve compliance.
- Drugs with synergistic effects should be combined pertinently to enhance BP lowering effect as to achieve the target BP.
- Use of long acting drugs provide 24-hour efficacy with once daily administration ensures smooth and sustained control of blood pressure; which in turn is expected to provide greater protection against the risk of major cardiovascular events and target organ damage. Once daily administration also improves patient compliance.
- Although anti-hypertensive therapy is generally lifelong an effort to decrease the dosages after effective control of hypertension (step-down therapy).
- Due to greater seasonal variations of temperatures in India, marginal alteration in dosages of drugs may be needed from time to time.

AIMS AND OBJECTIVES:

- To study the effectiveness of antihypertensives in reducing the cardiovascular outcomes.
- To evaluate the appropriate therapeutic approach for cardiovascular problems.

METHODOLOGY:

The study was performed on outpatients of cardiology department of Sri Krishna Institute of Medical Sciences, located beside Manipuram flyover, near RTC bus stand, Thamma ranga reddy nagar, Guntur, Andhra Pradesh-522001. This is a prospective and observational study which involves collection of echo reports and blood

pressure and does not involve any invasive techniques like collection of blood samples. The study was carried out for a period of six months i.e; from November 6, 2017 to April 6, 2017 at Sri Krishna Institute of medical sciences, Guntur.

Inclusion criteria:

- Patients diagnosed with hypertension of age above 18 yrs.
- Patients with heart diseases or disorders who use antihypertensives.
- Patients with or without any co-morbid conditions.
- Patients of outpatient ward of cardiology department who fit to our study.
- Patients of either gender.
- Patients who comply to participate in the study with a written informed consent.

Exclusion criteria:

- Patients not willing to participate in the study.
- Patients admitted to wards other than cardiology.
- Patients who do not receive any antihypertensives.
- Patients below 18 yrs of age.
- Pregnant and lactating women.

RESULTS AND DISCUSSION:

Initially 150 patients from cardiology department were included in the study based on the inclusion criteria and 18 patients were excluded from the study. Among 18 patients 7 were not interested to participate in the study, 11 patients has no proper follow up.

Table 1 Gender Distribution of the patients included in the study:

The total number of patients included in the study was 132 out of which 75 patients were male (57%) and 57 patients were female (43%), indicating 14% higher prevalence of hypertension in the male population.

Table 1. Gender Distribution of the patients included in the study

TYPE OF PATIENT	No. OF PATIENTS	PERCENTAGE (%)
MALE	75	57
FEMALE	57	43
TOTAL	132	100

Table 2 Age of the patients included in the study that were prescribed with antihypertensive medications

Among the 132 patients included in the study

- The mean age of the male patients is 60.44 ± 8.13 years.
- The mean age of the female patients is 59.73 ± 10.55 years.
- The mean age of the total population is 60.13 ± 9.22 years.

Table 2. Age of the patients included in the study that were prescribed with antihypertensive medications

Study population age	MALE	FEMALE	TOTAL
MEAN	60.44	59.73	60.13
STANDARD DEVIATION	8.13	10.55	9.22

Table 3 Age distribution of the patients

Among 132 patients 38.6% were of age group 61 to 70yrs; 31.8% were of age group 51 to 60yrs; equal distribution i.e; 13.6% is seen among the age groups 40 to 50 yrs and 71 to 80 yrs; and only 2% of the patients were below 40 yrs of age.

Table 3. Age distribution of the patients

Age group (years)	No.of Persons	Percentage (%)
<40	3	2.2
40-50	18	13.6
51-60	42	31.8
61-70	51	38.6
71-80	18	13.6

Table 4.1 & 4.2. Statistical analysis of Blood Pressure readings before and after treatment with antihypertensives

Among 132 patients included in the study the mean of the B.P. before treatment is 147.95 ± 12.766 mm Hg and the mean of the B.P. after being treated with anti-hypertensives for four visits (6 months) is 123.41 ± 8.545 mm Hg. This shows that there is a significant reduction in B.P. i.e., 24.545 ± 12.562 , having a p value is <0.0001 which is depicted in the table 4.1 & 4.2.

Table 4.1. Statistical analysis of Blood Pressure readings before and after treatment with antihypertensives

Paired Samples Statistics					
		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Before treatment	147.95	132	12.766	1.111
	After treatment	123.41	132	8.545	0.744

Table 4.2. Statistical analysis of Blood Pressure readings before and after treatment with antihypertensives

		Paired differences				t	Df	Sig(2-tailed)
		Mean	Std.deviation	95% Confidence interval of the difference				
				Lower	upper			
before treatment	treatment-after	24.545	12.562	22.382	26.708	22.449	131	<0.0001

Table 5 & 6. Statistical analysis of 2D echocardiographic parameters before and after treatment with antihypertensives

- Among 132 patients included in the study the mean of the EDD before treatment is 5.12 ± 0.52 and the mean of the EDD after being treated with antihypertensives for four visits (6 months) is 4.68 ± 0.3 . This shows that there is a significant reduction in EDD i.e., 0.44 ± 0.42 having a p value <0.0001 which is depicted in the table 5 and 6.
- Among 132 patients included in the study the mean of the ESD before treatment is 4.00 ± 0.72 and the mean of the ESD after being treated with antihypertensives for four visits (6 months) is 3.64 ± 0.46 . This shows that there is a significant reduction in ESD i.e., 0.35 ± 0.48 having a p value <0.0001 which is depicted in the table 5 and 6.
- Among 132 patients included in the study the mean of the EF before treatment is 57.82 ± 17.97 and the mean of the EF after being treated with antihypertensives for four visits (6 months) is 67.65 ± 10.90 . This shows that there is a significant improvement in EF i.e., 9.82 ± 9

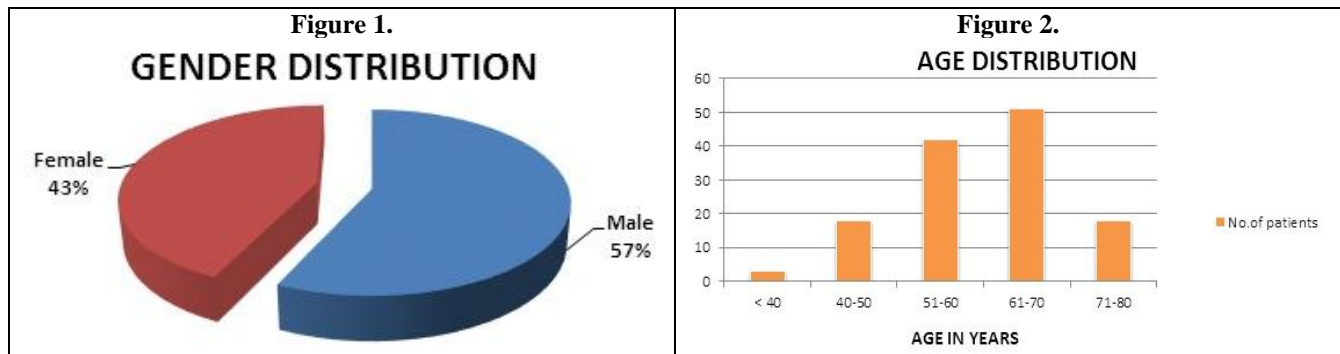
- having a p value <0.0001 which is depicted in the table 5 and 6.
- Among 132 patients included in the study the mean of the LA before treatment is 3.71 ± 0.64 and the mean of the LA after being treated with antihypertensives for four visits (6 months) is 3.3 ± 0.26 . This shows that there is a significant reduction in LA i.e., 0.40 ± 0.51 having a p value <0.0001 which is depicted in the table 5 and 6.
- Among 132 patients included in the study the mean of the IVSD before treatment is 1.15 ± 0.24 and the mean of the IVSD after being treated with antihypertensives for four visits (6 months) is 0.88 ± 0.11 . This shows that there is a significant reduction in IVSD i.e., 0.26 ± 0.20 having a p value <0.0001 which is depicted in the table 5 and 6.
- Among 132 patients included in the study the mean of the PW before treatment is 1.08 ± 0.19 and the mean of the PW after being treated with antihypertensives for four visits (6 months) is 0.85 ± 0.07 . This shows that there is a significant reduction in PW i.e., 0.22 ± 0.16 having a p value <0.0001 which is depicted in the table 5 and 6.

Table 5. Statistical analysis of 2D echocardiographic parameters before and after treatment with antihypertensives

Echo parameter	EDD		ESD		EF		LA		IVSD		PW	
	B.T	A.T	B.T	A.T	B.T	A.T	B.T	A.T	B.T	A.T	B.T	A.T
Mean	5.12	4.68	4.0	3.64	57.8	67.6	3.71	3.30	1.15	0.88	1.08	0.85
N	132	132	132	132	132	132	132	132	132	132	132	132
S.D	0.52	0.30	0.72	0.46	17.9	10.9	0.64	0.26	0.24	0.11	0.19	0.07
Std.error Mean	0.04	0.02	0.06	0.04	1.56	0.94	0.05	0.02	0.02	0.00	0.01	0.00

Table 6. Statistical analysis of 2D echocardiographic parameters before and after treatment with antihypertensives

before treatment-after treatment	Paired differences				Total	Df	Sig(2- tailed) p value
	Mean	Std.deviation	95% Confidence interval of the difference				
			Lower	Upper			
EDD	0.44697	0.42380	0.37400	0.51994	12.117	131	<0.0001
ESD	0.35530	0.48682	0.27148	0.43913	8.385	131	<0.0001
EF	-9.82576	9.00763	-11.37672	-8.27479	-12.533	131	<0.0001
LA	0.40379	0.51056	0.31588	0.49170	9.086	131	<0.0001
IVSD	0.26894	0.20937	0.23289	0.30499	14.758	131	<0.0001
PW	0.22576	0.16514	0.19732	0.25419	15.707	131	<0.0001



CONCLUSION:

In this study, it was observed that males were mostly affected with hypertension than females and also revealed that hypertension is most prevalent in patients of age group 51-70 years. The BP and Echo (EDD, ESD,

IVSD, PW, LA, and EF) results of the study concluded that the proper adherence and administration of antihypertensives is effective in normalizing the elevated BP levels and also reduced the risk of CV outcomes in most of the patients.

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