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A STUDY ON PRESCRIBING PATTERN OF ANTIHYPERTENSIVES AT A TERTIARY CARE HOSPITAL

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ABSTRACT

The retrospective study on prescribing patterns of antihypertensives showed that the prevalence of hypertension was predominantly more with male patients than in female patients. It was also found that the average age of the overall study population was 56 years. The average age of the population clearly indicates the elderly patients were affected more. The results indicates that around 57.6% of the patients were brought to normal or prehypertension after the successful treatment with antihypertensive agents. The remaining 42.4% were brought to high normal after the treatment. The study revealed that the physician were treated 44.73% of the patients population with Ramipril alone as mono therapy, 21.05% were treated with Atenolol, 10.52 % were treated with Amlodipine, and other patients are treated with Amiodarone, Prazonin HCL, and Telmisarten etc. The most commonly prescribed combination was found to be Ramipril with Atenolol and it is followed by Ramipril with Amlodipine. The overall percentages of these combinations were found to be 37.25 % and 25.0% respectively.

INTRODUCTION: Hypertension is defined as a systolic blood pressure (SBP) higher than 140 mmHg or a diastolic blood pressure (DBP) higher than 90 mmHg; the diagnosis is based on the average of 2 or more readings taken at each of 2 or more visits after an initial screening [1, 2]. When determined by these criteria, hypertension affects 20% to 30% of the adult population in most developed countries, and its prevalence appears to increase with the age of the patient.[3-5] Recent publications have shown that the lifetime risk of hypertension for patients who are normotensive at age 55 is 90% [1].

African Americans are affected by hypertension nearly twice as often as whites and seem to be more vulnerable to its complications [5, 6]. Hypertension is an important risk factor for cardiovascular accidents, coronary heart disease, cardiac hypertrophy with heart failure (hypertensive heart disease), aortic dissection, and renal failure. Hypertension can also accelerate atherogenesis and can induce changes favourable for aortic dissection and cerebrovascular haemorrhage [7]. Despite the prevalence of hypertension and its associated complications, only 29% of patients with hypertension are treated, and only 45% of those treated with antihypertensive medications have controlled disease [7, 8].

GOAL OF THE TREATMENT FOR HYPERTENSION (JNC [9], ESH [10], WHO-ISH [11], BSH [12]): The ultimate goal of public health in antihypertensive therapy is to minimize the cardiovascular and renal morbidity and mortality. Those with age more than 50 years, hypertension will reach the diastolic blood pressure goal once the systolic blood pressure goal is achieved, the primary focus should be on attaining the systolic blood pressure goal. Decrease in cardiovascular disease rate can be obtained when blood pressure less than 140/90 mmHg. In patients with hypertension and diabetes or renal disease, the blood pressure goal is less than 130/80 mmHg.

TABLE 1: STANDARD TREATMENT GUIDELINES FOR TREATMENT OF HYPERTENSION BY JNC7[9], WHO- ISH[11], BSH[12], ESH[10]

COMPELLING INDICATIONS	JNC7 GUIDELINES	WHO-ISH GUIDELINES	BSH GUIDELINES	ESH GUIDELINES
I. CVS a. Heart Failure/CHF	Diuretics/BBs/ ACEIs/Aldosterone antagonists	BBs/Spiranolactone	ACEIs	Diuretics/BBs/Aldosterone antagonists
b. Left Ventricular dysfunction		BBs/ ACEIs	ACEIs	ACEIs
c. Left Ventricular hypertrophy		ARBs	ARBs	ARBs
d. Heart failure in ACE intolerance patients after MI			ARBs	
e. Post MI	BBs/ ACEIs/ Aldosterone antagonists	ACEIs	CAEIs	Diuretics/BBs/ ACEIs/Aldosterone antagonists
f. Angina			BBs/CCBs	BBs/CCBs (DHCCBs/ verapamil/ diltiazem)

g. Recurrent stroke prevention/Cerebrovascular disease	Diuretics/ ACEIs	Diuretics/ ACEIs	Diuretics (Thiazides)/ ACEIs	
h. High coronary disease risk	Diuretics/BBs/ ACEIs/CCBs			
i. Supra ventricular tachycardia				CCBs (verapamil/ diltiazem)
j. Carotid atherosclerosis				CCBs (DHCCBs/ verapamil/ diltiazem)
II. DIABETES a. Diabetes	Diuretics /BBs/ACEIs/ ARBs/CCBs			
b. Type I Diabetic Nephropathy		ACEIs	ACEIs	ACEIs
c. Type II Diabetic Nephropathy		ARBs	ARBs	ARBs
d. Proteinuria / Diabetic micro albuminuria				ACEIs/ ARBs
e. Non Diabetic Nephropathy		ACEIs		ACEIs
III. ISH Elderly hypertensive/ Isolated Systolic Hypertension		Diuretics /CCBs	Diuretics (Thiazides/ Thiazides like) /CCBs	Diuretics (Thiazides) / CCBs(DHCCBs)
IV. KIDNEY a. Chronic Kidney Disease b. Renal insufficiency	ACEIs/ ARBs			
V. OTHERS a. Benign Prostate Hypertrophy, Hyperlipidemia			Alpha blockers	
b. Peripheral Vascular Disease				CCBs (DHCCBs)
c. ACEI intolerance			ARBs	ARBs
d. Hypertension with pregnancy				BBs / CCBs (DHCCBs)

BBs-Beta Blockers, ACEIs-Angiotensin Converting Enzyme Inhibitors, ARBs-Angiotensin Receptor Blockers, CCBs-Calcium Chanel Blockers, DHCCBs- Dihydropyridine Calcium Channel Blockers

TABLE 2: PHARMACOLOGICAL TREATMENT

SITE OF ACTION	DRUG	DOSAGE	CONTRAINDICATION	SIDE EFFECTS
RENAL TUBULE	Thiazides e.g.: Hydrochlorothiazide	Oral:-12.5-25 mg daily	Diabetes Mellitus, Hyperuricemia, Primary Aldosteronism	Potassium Depletion, Hyperglycemia, Hyperkalemia, Dermatitis
	Loop acting	Oral:- 20-80 mg 2 or 3 times daily	Hyperuricemia, Primary aldosteronism	Potassium depletion, Hyperglycemia, Nausea, Vomiting, Diarrhoea
	Potassium sparing e.g.: Spironolactone	Oral:- 25 mg 2 to 4 times daily	Renal failure	Hyperkalemia, Diarrhea, Gynaecomastia, Menstrual irregularities
	Amiloride	Oral:- 5-10 mg daily		Hyperkalemia, Nausea, Vomiting, Leg cramps, GI disturbances
ANTIADRENERGIC AGENTS				
CENTRALLY ACTING	Clonidine	Oral:- 0.05-0.6 mg twice daily		Postural Hypotension, Drowsiness, Dry mouth, Insomnia
	Methyldopa	Oral:- 250-1000 mg twice daily	Pheochromocytoma, Active hepatic disease	Postural Hypotension, Sedation, Fever, Gynaecomastia, Diarrhea,
NERVE ENDINGS	Reserpine	Oral:- 0.05-0.25 mg daily	Pheochromocytoma, Peptic ulcer, Depression, Severe coronary artery disease	Depression, Night mares, Nasal congestion, Dyspepsia, Impotence
	Guanethidine	Oral:- 10-150 mg daily	Pheochromocytoma, Peptic ulcer, Depression, Severe coronary artery disease	Bradycardia, Dry mouth, Diarrhea, Fluid Retention, Asthma
ALPHA RECEPTOR BLOCKER	Prazosin	Oral:- 1-10 mg twice daily	Use with caution in the elderly	Fluid retention, head ache, sedation, dizziness, tachycardia
	Terazosin	Oral:- 1-20 mg daily	Use with caution in the elderly	Fluid Retention, Head Ache, Sedation, Dizziness, Tachycardia
	Doxazosin	Oral:- 1-8 mg daily	Use with caution in the elderly	Fluid retention, Head Ache, Sedation, Dizziness, Tachycardia
BETA RECEPTOR BLOCKER	Propranolol	Oral: 10-120 mg 2 to 4 times daily	CHF, Asthma, Diabetes, COPD, Heart block	Dizziness, Depression, Bronchospasm, Nausea, Vomiting

ALPHA/ BETA RECEPTOR BLOCKER	Metaprolol	Oral: 25-150 mg twice daily	CHF, Asthma, Diabetes, COPD, Heart block	Dizziness, Depression, Bronchospasm, Nausea, Vomiting
	Atenolol	Oral: 25-100 mg daily	CHF, Asthma, Diabetes, COPD, Heart block	Dizziness, Depression, Bronchospasm, Nausea, Vomiting
	Labetalol	Oral:25-100mg daily, IV: 2mg/min		
VASODILATORS				
VASCULAR SMOOTH MUSCLE	Hydralazine	Oral: 10-75mg 4 times daily, IV or IM: 50mg every 6 hours	Lupus Erythematous, Severe coronary artery disease	Head ache, Tachycardia, Angina Pectoris, Anorexia, Nausea, Vomiting, Rash, Diarrhea, Fluid retention
	Minoxidil	Oral: 25-100mg daily, IV: 2mg/min	Severe coronary artery disease	Tachycardia, Fluid Retention
	Nitroprusside	IV: 0.5-8 (µg/kg)/min		Nausea, Vomiting, Weakness
ANGIOTENSIN CONVERTING ENZYME INHIBITORS				
CONVERTING ENZYME	Captopril	Oral: 12.5-75 mg twice daily	Renal failure	Leucopenia, Pancytopenia, Cough, Angioedema Fever, Hyperkalemia,
	Enalapril	Oral: 2.5-40 mg daily		
	Lisinopril	Oral: 5-40 mg daily		Leucopenia, Cough, Angioedema
	Ramipril	Oral: 2.5-20 mg daily		
ANGIOTENSIN RECEPTOR ANTAGONISTS				
ANGIOTENSIN RECEPTOR BLOCKER	Losartan	Oral:2.5-50 mg once or twice daily	Pregnancy, Bilateral Renal Artery Stenosis	Hypotension, Acute Renal Failure in Bilateral Renal Artery Stenosis
CALCIUM CHANNEL ANTAGONISTS				
VASCULAR SMOOTH MUSCLE	Nifedipine	Oral:10-30 mg 4 times daily	Heart failure	Tachycardia, Flushing, Gastro Intestinal Disturbances, Hyperkalemia
	Amlodipine	Oral: 2.5-10 mg daily		
	Felodipine	Oral: 5-10 mg daily		

Non-Pharmacological Treatments [10]**:** Broadly non-pharmacological treatment can be divided into 2 categories. They are dietary interventions and behavioral interventions.

Dietary Interventions: Weight reduction, Reduction of alcohol intake, Reduction of salt intake, Potassium supplement, Calcium supplement, Magnesium supplement, Dietary fats, Dietary fiber, Fish oil, Caffeine and Vit. C.

Behavioral Interventions: Smoking cessation, Physical exercise, Relaxation. The primary objectives of the retrospective study were To analyze the patient history to identity the risk factors involved in the hypertension, To identify the co-morbidities, past and present illness, To monitor the prescription and trends in the treatment of hypertension.

METHODOLOGY: The retrospective study was carried out for a period of 4 months at a tertiary care teaching hospital. General Medicine and Cardiology department cases from the Medical Record Department were selected for the study, as there were many cases of hypertensive being admitted for the treatment of hypertension with various co-morbid conditions. Inpatients having Hypertension, Cardiac disorders, renal failure, diabetes mellitus and any co- morbid conditions were included in the study. Children's below 12 years, ICU patients, terminally ill patients were excluded from the study. Data were collected from patient's case sheet and transferred to data entry format for evaluation. The collected data were analyzed for its appropriateness and suitability. The interpretation was made for the collected data. From the data analysis, results were obtained and presented.

RESULTS AND DISCUSSION: The total number of patients included in the study was 86. Around 70.9 % (n=61) of the patients was found to be male and 29 % (n=25) was found to be female. The prevalence of hypertension was predominantly more with male patients than in female patients. The patients in this study population show a wide distribution among the age. A maximum of 76.7% (n=66) of population lies with the age between 40 and 70. A minimum of 9.3% of population lies with the age between 20 and 30. It was also found that the average age of the overall study population was 56 years. The average age of the population clearly indicates the elderly patients were affected more.

Hypertensive Status: In this study, we categorized the patient's population as previously hypertensive and hypertension for first time. It was alarming that 30 % of the total study population was identified as the first time hypertensive in the overall population.

Classification of Patients: We categorize the patients based on their systolic and diastolic blood pressure which was given in various guidelines. The result indicates that around 57.6% of the patients were brought to normal or prehypertension after the successful treatment with antihypertensive agents. The remaining 42.4% were brought to high normal after the treatment. 26.7% of the study population was found to be grade 1 (mild) hypertensives as per ESH, BHS, WHO-ISH, and JNC guidelines. Around 23.3% of the study population was found to have isolated systolic hypertension and rest of the population were moderate and severe hypertension.

Common Symptoms: The common symptoms of the study population were found to be 26% of the patients, had giddiness, 50% had vomiting, 24% had breathing difficulty, and 11% had sweating and cough. A variety of symptoms

were found like nausea, general tiredness, loss of consciousness, headache etc.

Treatment: The study revealed that the physician were treated 44.73% of the patients population with Ramipril alone as mono therapy, 21.05% were treated with Atenolol, 10.52% were treated with Amlodipine, and other patients are treated with Amiodarone, Prazosin HCL, Telmisarten, Nifedepine, Furosemide, Losartan potassium, Spironolactone, Captopril, Enalapril and Clonidine as mono therapy (Table 3).

TABLE 3: ANTIHYPERTENSIVE PRESCRIBED AS MONO THERAPY (N=54) (62.8%)

NAME OF THE DRUG	NUMBER OF PATIENTS	PERCENTAGE OF PATIENTS
Ramipril	34	62.96
Atenolol	10	18.52
Amlodipine	6	11.11
Furosemide	2	3.7
Metaprolol	2	3.7

The most commonly prescribed combination was found to be Ramipril with Atenolol and it is followed by Ramipril with Amlodipine. The overall percentages of these combinations were found to be 37.25 % and 25.0% respectively (Table 4).

TABLE 4: ANTIHYPERTENSIVES PRESCRIBED AS COMBINATION THERAPY (N=32) (37.2%)

NAME OF THE DRUG	NUMBER OF PATIENTS	PERCENTAGE OF PATIENTS
Ramipril + Atenolol	**10**	31.25
Ramipril + Amlodipine	8	25.0
Amlodipine + Atenolol	6	18.75
Amlodipine + Spironolactone	3	9.4
Spironolactone + Furosemide	3	9.4
Ramipril + Metaprolol	1	3.1
Prazosin HCL + Nifedepine	1	3.1

CONCLUSION: The study revealed that the prevalence of hypertension was predominantly more in male patients than in female patients. The average age of the population clearly indicates that elderly patients were affected more than other age group patients. About 30 % of the overall study population was identified as the first time hypertensive. The result also indicated that around 57.6% of the patients were brought to normal or prehypertension after the successful treatment with antihypertensive agents. This indicates that drugs were selected based upon the patient clinical conditions. A variety of common symptoms were found in the study population such as giddiness, vomiting, breathing difficulty, sweating, cough, nausea, general tiredness, loss of consciousness and headache. The study revealed that the physician were treated the patients population with Ramipril, Atenolol, Amlodipine, Furosemide, and Losartan potassium as mono therapy. The most commonly prescribed combination was found to be Ramipril with Atenolol and it is followed by Ramipril with Amlodipine.

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