

# Study of Prescribing Pattern of Antihypertensive Drugs and Evaluation of the Prescription with JNC 8 Guidelines in North Karnataka Hospital

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## ABSTRACT

**Aim:** To conduct a prospective observational study on prescribing pattern of anti-hypertensive drugs and to evaluate the current practice of antihypertensive drug by comparing with JNC-8 guidelines in north Karnataka hospital. **Methods:** The study was conducted for a period of 6 months with a sample size of 100 of all the in-patient of age  $\geq 18$  years of hypertension with or without co-morbidities, including pregnant women and lactating mothers. **Results:** A total of 100 prescriptions were analysed during the six-month study period. 55% were male while 45% were female. 25% patients received monotherapy while majority of the patient's i.e. 75% were put on multidrug therapy of which, 35% patients on two drug therapy, 32% of patients on three drug therapy and 8% on four drug therapy. The most common drug classes involved in the study were ARBs (17%), BBs (09%) and ACEIs (03%). Our study reveals that without diabetes or CKD (greater than 60 years) 75.60% of patients were compliant with JNC-8 goal (less than 150/90 mmHg) and without diabetes or CKD (less than 60 years) 64.30% of patients were compliant with JNC-8 goal (less than 140/90 mmHg). Patients with diabetes and without CKD (all ages) 50% achieved the JNC-8 goal (less than 140/90 mmHg) and Patients with CKD or without DM (all ages and races) 60% achieved the JNC-8 goal (less than 140/90 mmHg). **Conclusion:** Calcium channel blockers (Amlodipine) and diuretics (Furosemide) were the drug of choice for hypertensive patients as a single drug and combination drug therapy. As per the JNC 8 guidelines majority of the BP goals were achieved. Our result reveals that antihypertensive medication adherence to JNC 8 guidelines is optimal at the study site.

**Key words:** Prescription pattern, Anti-hypertensive, In-patients, JNC-8, Co-Morbidities

## INTRODUCTION

Hypertension is not a disease but an important risk factor for cardiovascular complications. It is defined as a condition in which blood pressure is elevated to an extent where benefit is obtained from blood pressure lowering.<sup>1</sup> Hypertension refers to prolonged and persistent elevation of blood pressure above the normal range. If not treated properly, hypertension can cause severe complications such as stroke, coronary heart disease and kidney failure. Patient with hypertension must take antihypertensive drugs on a long term basis. Although such drugs cannot give a radical cure, they can

prevent heart failure, kidney failure and acute stroke induced by hypertension and delay the development of atherosclerosis by controlling the blood pressure. Generally speaking antihypertensive drugs must be taken for life time.<sup>2</sup> It is estimated that 972 million adults were affected by hypertension worldwide, with 66% of those affected were from low and middle income countries. Hypertension is directly responsible for 57% of all stroke deaths and 24% of all coronary heart disease deaths in India.<sup>3</sup>

According to Directorate General of

DOI: 10.5530/ijopp.11.4.40

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Health Services, Ministry of Health and Family Welfare, Government of India, the overall prevalence of hypertension in India by 2020 will be 159.46/1000 population.<sup>4</sup>

## MATERIALS AND METHODS

A Prospective observational study was carried out for the period of six months in the In-patient department of North Karnataka Hospital. Prescriptions were analysed during the study period. All the of age  $\geq 18$  years with or without co-morbidities, including pregnant women and lactating mother who were diagnosed with hypertension as per JNC 8 guidelines and receiving antihypertensive drugs were included. Patient's data relevant to the study was obtained from the patients clinical records.

## RESULTS

### Age and Gender Group Distribution of Patient

Most of the male and female hypertensive patients were

**Table 1: Age group distribution of patients.**

Category	less than 40years	40-60 years	Greater than 60 years	Total
Male	09	27	19	55
Female	02	28	16	45

**Table 2: Comorbidities of the patients.**

Comorbidity	Number of Patient	Percentage (%)
CVA	21	29.59
COPD	10	14.09
Diabetes Mellitus(DM)	09	12.68
IHD	07	09.87
CKD	05	07.04
MI	02	02.81
CCF	02	02.81
ALD	02	02.81
Asthma	02	02.81
GE	02	02.81
Hemiplegia	02	02.81
Malaria	01	01.41
LVF	01	01.41
Arthritis	01	01.41
Hepatitis	01	01.41
Angina	01	01.41
Hypoglycemia	01	01.41
Renal calculi	01	01.41

in the age group of 40-60 years shown in Table 1.

### Comorbidities of the Patients

Out of 100 patients, comorbidity was found in 71 subjects, the most common one being CVA (29.59%) followed by COPD (14.09%) and others shown in Table 2.

### Number of drugs prescribed

The numbers of combinational drugs which are prescribed are shown in Table 3.

### Frequency of Administration of Antihypertensives

CCBs and Diuretics were the most commonly prescribed group with equal frequency (43%), the next common group in the order was ARBs (17%), BB is (09%) and

**Table 3: Number of Drugs Prescribed.**

Number Of Antihypertensive	Total Number of Prescription	Percentage (%)
Mono Drug ( CCB, D, ARB, ACEI)	25	25
Two Drugs( CCB+D, D+ARB)	35	35
Three Drugs (MANNITOL+ D+CCB, D+CCB+D)	32	32
Four Drug (D+CCB+A+MANNITOL, D+A+CCB+CCB)	08	08

**Table 4: Frequency of Drug Administration (class of drugs prescribed).**

ANTIHYPERTENSIVE	NAME OF DRUG	NUMBER OF DRUGS
CALCIUM CHANNEL BLOCKERS (CCBs) (43%)	AMLODIPINE	39
	NEFEDIPINE	04
	FUROSEMIDE	26
DIURETICS (43%)	SPIRONOLACTONE	04
	MANNITOL	13
BETA BLOCKERS (BB) (09%)	ATENOLOL	06
	METAPROLOL	03
	ANGIOTENSIN RECEPTOR BLOCKERS (ARBs) (17%)	LOSARTON
ANGIOTENSIN CONVERTING ENZYME INHIBITORS (ACEI) (03%)	RAMIPRIL	03

**Table 5: Prescription pattern of antihypertensive drugs.**

MONOTHERAPY		THREE DRUG COMBINATION		FOUR DRUG COMBINATION	
Drug Regimen	No (%)	Drug Regimen	No (%)	Drug Regimen	No (%)
CCB	15	D+ D + CCB	16	D + CCB + ARB + D	01
D	08	D + CCB + D	03		
ARB	04	D + ARB + CCB	02	D + ARB + CCB + CCB	01
ACE	02	D + CCB + BB	02		
<b>TWO DRUG COMBINATION</b>		D + CCB + CCB	01	D + CCB + ARB + BB	01
Drug Regimen	No (%)	D + D + ARB	01		
CCB + D	28	D + CCB + ARB	01	D + CCB + D+ CCB	01
D + ARB	03	D + ARB + CCB	01		
BB + ACE	01	D + ARB + D	01	D + D + CCB + BB	01
ARB + CCB	01	CCB + CCB + D	01		
CCB + BB	01	D + ARB + CCB	01	D + D + CCB + ARB	01
D + D	01	BB + CCB + D	01		
		CCB + D + BB	01	D + CCB + BB + ARB	01
		D + CCB + D	01		

**Table 6: BP goals as per JNC-8.**

Disease	Population	Goal BP	Number of Patients		Percentage (%)	
			Achieved	Not Achieved	Achieved	Not Achieved
Without Diabetes Or CKD	Greater than 60 years	less than 150/90	31	10	75.60	24.4
Without Or CKD	Less than 60 years	less than 140/90	27	15	64.3	35.7
Diabetes Present Without CKD	All Ages	less than 140/90	06	06	50	50
With CKD With Or Without Diabetes	All Ages and Recess	less than 140/90	03	02	60	40

ACEI is (03%) prescribed as shown below in Table 4.

### Prescription Pattern of Antihypertensive Drugs

Our study shows that CCBs were the most commonly prescribed drug under monotherapy (15%) followed by diuretics (08%) and ARB (04%) and ACEI (02%) respectively. In two drug combination therapy study shows that CCB+D (28%) were the most commonly prescribed drug followed by D+ARB (03%), D+ARB, B+ACE, ARB+ CCB, CCB+ B, D+D (01%) respectively. In three drug combination therapy study shows that D + D +CCB (16%) were the most commonly prescribed drugs followed by D+CCB+D (03%) and D+ARB+CCB, D+CCB+ B (02%) and remaining combination drugs are 01% respectively. In four drug combination therapy study shows that only 01% of the prescription contain of each combinational therapy as shown below. (Table 5)

### BP Goal as per JNC-8

According to JNC-8 guidelines out of 41 patients without diabetes or CKD (greater than 60 years) 31 has achieved (75.60%) the JNC-8 goal (less than 150/90 mmHg) and

patients category of without diabetes or CKD, (less than 60 years) out of 42 patients 27 has achieved (64.30%) the goal (less than 140/90 mmHg). In patient with diabetes and without CKD (all ages), out of 12 patients 06 achieved (50%) the goal (less than 140/90 mmHg) and In CKD present with or without DM (all ages and races), out of 05 patients 03 patients achieved (60%) the goal (less than 140/90 mmHg) (Table 6).

### DISCUSSION

The results of our study suggests that out of the total 100 hypertensive patients included in the study, 55% were male while 45% were female, indicating the higher prevalence of hypertension in male than in female population.

Our result reveals that the highest number of male hypertensive patients 27% belonged to the age group of 40-60 years and the highest number of female hypertensive patients 28% also belonged to the age group of 40-60 years suggesting the earlier onset of hypertension in females than in males. Whereas male

hypertensive patients belonged to the age group of less than 40 years (09%) and above 60 years (19%) has the highest number than the female hypertensive patients belonged to the age group of less than 40 years (02%) and above 60 years (16%). A similar study conducted by Krishna Murti *et al.* showed that 35% of male belong to age group of 40-60 years and 12.4% of female belong to the age group of above 60 years.

In our study, 25% patients received monotherapy, while majority of the patient's i.e. 75% were put on multidrug therapy out of which 35% patients were on two drug therapy, 32% of patients on three drug therapy and 08% on four drug therapy.<sup>5</sup> Among the monotherapy category the various hypertensive classes prescribed were CCB's (15%) followed by Diuretics (08%), ARB's (04%) and ACEI (02%) respectively. As a Monotherapy Amlodipine (15%) was the most frequently prescribed drug along with furosemide (08%), telmisartan (02%), losartan (02%), and ramipril (02%). In the overall utilization pattern of antihypertensive agents, CCB's (43%) and Diuretics (43%) were the most frequently prescribed class of drugs, followed by ARB's (17%), BB (09%) and ACEI's (03%). As compared to Krishna murti *et al.* out of the total 137 patients 27.73% patients were received monotherapy, while the majority of the patients 72.26% were put on multidrug therapy with 68.68% patients on two drug therapy, 27.27% patients on three drug therapy and 4.04% on four drug therapy. Among the monotherapy category the various hypertensive classes prescribed were ranked as follows; diuretics (28.94%), followed by CCBs (23.68%), ACEIs and BBs (18.42%) and lastly ARBs (10.52%). Amlodipine (21.72%) was the most frequently prescribed drug as monotherapy along with Thiazides (19.67%), Metoprolol (18.36%), Ramipril (15.84%) and Telmisartan (12.93%).

The most frequently prescribed 2 drug regimen was a combination therapy of CCB + D (28%) while the most frequently prescribed 3 drug regimen was found to be a combination therapy of Mannitol + D + CCB (16%).

Out of the total study subjects, 71% hypertensive patients were found to have other co morbid conditions. Among the total 71% of co morbid patients, CVA (29.59%), COPD (14.09%), DM (12.68%), IHD (09.87%), CKD (07.04%) and others. Where as study conducted by Anand R. Kalamdani *et al.* showed that out of 100 patients, co morbidity was found in 64 subjects, the most common one being Diabetes mellitus (75%), followed by COPD (14%) and others.<sup>6</sup>

According to JNC-8 guidelines<sup>7-12</sup> our study reveals that in patients without diabetes or CKD (greater than 60 years

75.60% achieved the goal (less than 150/90mmHg) and patients without diabetes or CKD (less than 60 years) 64.30% achieved the goal (less than 140/90mmHg). Patients with Diabetes and without CKD (all ages) 50% achieved the goal (less than 140/90 mmHg) and patients with CKD with or without DM (all ages and races) 60% achieved the goal (less than 140/90 mmHg), which shows that the hypertensive goals were being achieved in this study.

## CONCLUSION

Calcium channel blockers (Amlodipine) and diuretics (Furosemide) were the drug of choice for treatment of hypertensive patients as a single drug and combination drug therapy. As per the JNC 8 guidelines majority of the BP goals were achieved. Our result reveals that antihypertensive medication adherence to JNC 8 guidelines is optimal at the study site.

## ACKNOWLEDGEMENT

We would like to express our gratitude to everyone who was instrumental in this study. We sincerely thank Dr B N Joshi district surgeon of Govt. district hospital, Gulbarga, without whom this study would not have been possible.

## CONFLICT OF INTEREST

No conflict of interest is declared.

## ABBREVIATIONS

**ACEI:** Angiotensin converting Enzyme Inhibitor; **ARB:** Angiotensin receptor blocker; **CCBs:** Calcium channel Blockers; **BBs:** Beta blockers; **DM:** Diabetes Mellitus; **CKD:** Chronic Kidney Disease; **HTN:** Hypertension; **COPD:** Chronic obstructive Pulmonary Disease; **IHD:** Ischemic Disease; **CVA:** Cerebrovascular accident; **MI:** Myocardial Infarction; **CCF:** Congestive cardiac failure; **ALD:** Alcohol Liver Disease; **GE:** Gastroenteritis; **LVF:** Lower Ventricular Failure; **JNC:** Joint National Committee; **IPD:** In patient Department; **DDI:** Drug-drug Interaction; **D:** Diuretics.

## SUMMARY

- The most common drug classes involved are Angiotensin receptor blocker followed by Beta Blockers and Angiotensin converting Enzyme

### Inhibitor.

- Calcium channel blockers (Amlodipine) and diuretics (Furosemide) were the drug of choice for treatment of hypertensive patients as a single drug and combination drug therapy.
- As per the JNC 8 guidelines majority of the BP goals were achieved.

## REFERENCES

1. Walker R, Whittlesea C. *Clinical Pharmacy and Therapeutics*. 4<sup>th</sup> edition. London: Churchill Livingstone Elsevier. 2007.
2. Harvard Medical School. Health A-to-Z: High blood pressure (Hypertension). Available from: [www.patienteducationcenter.org/information/high-blood-pressure-hypertension](http://www.patienteducationcenter.org/information/high-blood-pressure-hypertension). [26<sup>th</sup> June 2013]
3. Popuri RS, Malladi SR. Study of Prescriptive Patterns of Anti-hypertensive Drugs in South India. *International Journal of Advancements in Research and Technology*. 2013;2(6):295.
4. Nitin KN, Ganguly B. Adherence To JNC-VII and WHO-ISH guidelines of antihypertensive medications prescribed to hypertensive patients with co-morbid conditions. *Indian J Physiol Pharmacol*. 2015;59(1):48-56.
5. Murti K, Khan A, Dey A, Sethi M, Das P, Pandey K. Prescription Pattern of Anti-Hypertensive Drugs in Adherence to JNC- 7 Guidelines. *American Journal of Pharmacology and Toxicology*. 2015;10(1):27-31.
6. Kalamdani AR, Bhandare B, M.B Hemamalini, M.V Krishna. A Prospective Study of Prescribing Pattern of Antihypertensive Drugs in Tertiary Care Hospital, Bangalore. *Journal of Evolution of Medical and Dental Sciences*. 2014;2(52):10339-44.
7. Armstrong C. JNC 8 Guidelines for the Management of Hypertension in Adults. *American Family Physician*. 2014;90(7):503-4.
8. Michael R. The JNC 8 Hypertension Guidelines: An In-Depth Guide. *The American Journal of Managed Care*. 2014; 1.(<https://www.ajmc.com/journals/evidence-based-diabetes-management/2014/january-2014>).
9. Randal A. AHA/ACC/ASH Release Guideline on the Treatment of Hypertension and CAD. *American Family Physician*. 2015;92(11):1023-30.
10. James PA, Oparil S, Carter BL, Cushman WC, Dennison-Himmelfarb C, Handler J. *et al*. 2014 Evidence-based guideline for the management of high blood pressure in adults: Report from the panel members appointed to the Eighth Joint National Committee (JNC 8) *JAMA*. 2014;311(5):507-20.
11. Sindhu PR, Reddy MS. Study of prescriptive patterns of antihypertensive drugs in South India. *International Journal of Advancements in Research & Technology*. 2013;2:295-311.
12. Arya SN. *Therapeutic challenge of resistant hypertension – Indian Perspective*. Medicine Update. 1<sup>st</sup> Edition India. Jaypee Brothers Medical Publishers Private Limited: 2007.