

Research Article



A Concurrent Study of Antihypertensive Drugs Utilization Pattern in Outpatients of A Tertiary Care Hospital

²B. Niveditha*, ²Prof. Dr. C. Gopinath, ³Dr. M. Sureswara Reddy, ⁴Dr. R. Venkata Anil Kumar, ⁵Dr. K. Phani, ⁵Dr. K. Prasanna Lakshmi

¹Assistant professor at Annamacharya College of Pharmacy, Rajampet, Andhra Pradesh, India.

²Professor and principal - JNTUA-Oil Technological and Pharmacy Research Institute, Anantapur, Andhra Pradesh, India.

³Department of General Medicine, Rajiv Gandhi Institute of Medical Sciences, Kadapa, Andhra Pradesh, India.

⁴Research scholar at JNTU Anantapuramu, Andhra Pradesh, India.

⁵Pharm-D, Annamacharya College of Pharmacy, Rajampet, Andhra Pradesh, India.

*Corresponding author's E-mail: niveditha.bovilla@gmail.com

Received: 10-12-2019; Revised: 18-01-2020; Accepted: 26-01-2020.

ABSTRACT

Aim of this study is to examine the pattern of physician's prescription of antihypertensive drugs and its possible effects on blood pressure as well as physician's compliance with recommended guidelines. This is a concurrent observational study done between September 2014 and 2015 February. Information on antihypertensive prescriptions was recorded and analyzed by using Student's t- test and one-way ANOVA. Among 206 patients 51% were on monotherapy and 49% on combination therapy. CCBs were the most frequently prescribed drug either as a single agent (29.12%) or as combination therapy (76.23%). There is no significant difference of mean reduction in both SBP and DBP in patients on ARBs, CCBs and selective BBs monotherapy. Mean reductions in both SBP and DBP were more in patients on combination therapy than those on monotherapy. BP control rate was 64.56%. As per our study the patients on combination therapy had significantly higher reduction in SBP and DBP than those on monotherapy and demonstrate that there is no significant difference in efficacy of ARBs monotherapy, CCBs monotherapy and BBs monotherapy in lowering BP in the study population. The prescribing pattern of physicians is in compliance with the JNC-VIII guidelines.

Keywords: Antihypertensives, prescription pattern, blood pressure control.

INTRODUCTION

According to the WHO criteria a systolic blood pressure greater than or equal to 140 mmHg or a diastolic blood pressure greater than or equal to 90 mmHg is defined as Hypertension¹. Hypertension affects approximately 1.13 billion people worldwide². In India prevalence of hypertension in urban areas was 24-30% and in rural areas was 12-14%. One-tenth of rural and one-fifth of urban Indian hypertensive population have their BP under control³. Several factors including, among others, poor adherence to therapeutic regimen, ignorance, and poverty have been adduced for the high prevalence of uncontrolled hypertension. Recent reports have however focused on the role of health care provider to poor adherence to antihypertensive drugs consequently, compliance with standard guidelines aiding physicians in effective prescription of antihypertensive drugs have been emphasized⁴. Lack of awareness in prescribing pattern of antihypertensives will lead to the worsening of disease and development of complications in those patients. Physician criteria for antihypertensive prescribing may differ from that established in clinical guidelines. This may be due to concerns among physicians that the clinical guideline recommendations may not apply to all hypertensive patients in primary care. We used the JNC-VIII guidelines as reference guidelines to assess variations in antihypertensive prescribing over the study period⁵.

This study is aimed at determining the physicians' prescription pattern of antihypertensive medications in a

tertiary health institution (RIMS Kadapa, Andhra Pradesh). Physicians' compliance with the existing guidelines is described.

MATERIALS AND METHODS

This is a concurrent observational study done between 1st September 2014 and 2nd march 2015, in Rajiv Gandhi Institute of Medical Sciences, Kadapa, Andhra Pradesh, India. Records of 206 patients aged between 40- 91years (mean: 59.89 ± 10.27) with a male to female ratio of 1.51:1 were selected by simple random sampling technique using table of random numbers. Clinical records were excluded due to incomplete data.

Demographic and clinical information including age, gender, and documented blood pressure at the time of first clinic attendance or admission, blood pressure at subsequent visits, and the anti-hypertensive medications were recorded⁴.

Patients were counseled for antihypertensive drug use and lifestyle modifications.

Monotherapy was defined as a prescription for one agent, or two within the same drug class. Combination therapy was defined as a prescription for more than one agent from two classes, including two agents in one formulation.⁶ Blood pressure control was defined as the maintenance of blood pressure values less than the target blood pressure according to the JNC-8 guidelines during at least last two successive appointments. Patients taking at



least 80% of the prescribed tablets were considered adherent. In case of the outpatients, clinic adherence was determined using compliance with outpatient clinic appointments. Patients with 75% clinic attendance were regarded as clinic adherent, while patients with <75% attendance were recorded as non-adherent. Different stages of hypertension were defined using the JNC-VII guidelines.

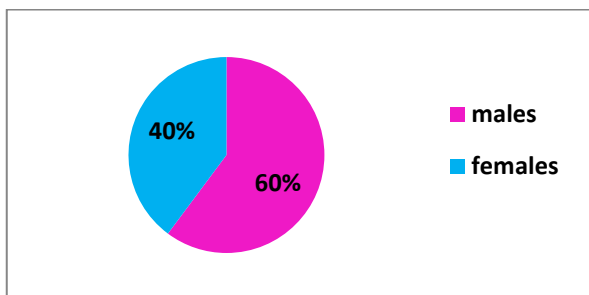
Data analysis was done using the Microsoft excel and graph pad prism.

Continuous data are presented as mean and standard deviation, while categorical data are presented as percentages ⁴. Differences between means of two groups (mono vs. bi) were compared using paired student’s t test, while that differences among monotherapies i.e., CCBs, ARBs, BBs, were compared using one way ANOVA test. A p-value less than 0.05 was considered as significant.

RESULTS

The mean age of patients was 59.89 ± 10.25 years. Of the 206 patients studied, 60.19% and 39.80% were males and females, respectively (Fig.1).

Figure 1: Gender distribution of patients in the study population (n=206)



The most frequent stage of hypertension among the patients was stage-1 hypertension (44.17%). Pre

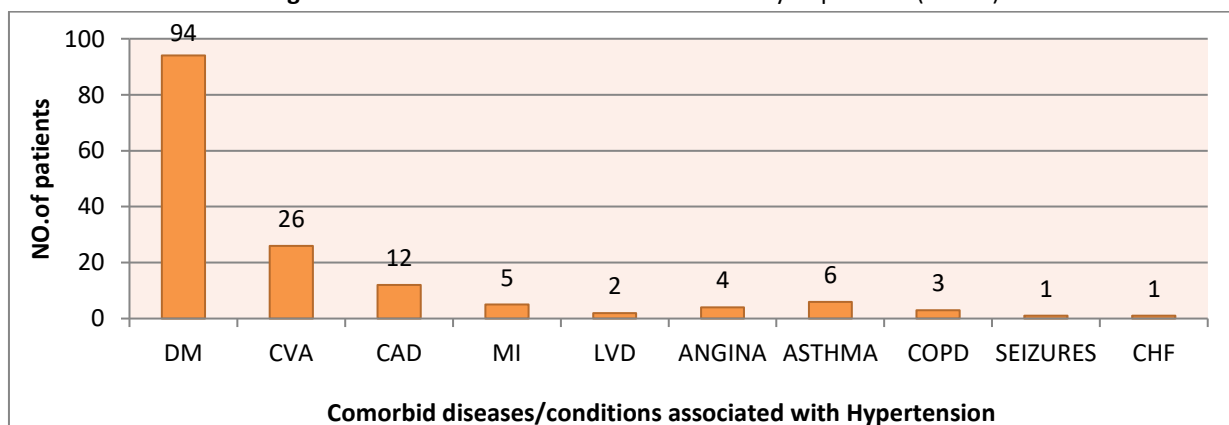
hypertension, and stage-2 hypertension, was observed in 26.21%, and 29.61% of the patients respectively.

The co-morbid conditions that were documented among the study population included diabetes mellitus (45.63%), stroke (12.62%), coronary artery disease (5.82%), Asthma (2.91%), Myocardial infarction (2.42%), Angina(1.94%), COPD (1.46%), Chronic kidney disease (0.97%), LVD (0.97%), Seizures (0.48%), and CHF (0.48%) (Fig.2).

Table 1: Pattern of prescription of antihypertensive drugs

Drug regimen	No (%)
(i) Monotherapy	50.79%
CCBs	60(57.10)
ARBs	26(24.70)
BBs	15(14.20)
ACEI	04(3.80)
(ii) 2 drug Combinations	46.60%
BBs+CCBs	44(45.83)
ARBs+ CCBs	24(25)
BBs+ ACEs	08(8.33)
ARBs+ Diuretics	05(5.20)
ARBs+ BBs	5(5.20)
BBs+ Diuretics	04(4.16)
CCBs+ ACEs	03(3.12)
CCBs+ Diuretics	02(2.1)
ARBs+ ACEs	01(1.04)
(iii) 3 drug combinations	1.94%
ARBS + CCBS + BBs	02 (50)
BBs+ CCBs+ Diuretics	01(25)
ARBS+ CCBS+ DIURETICS	01(25)
(iv) 4 drug combinations	0.49%
ACEI + Diuretics+ Aldosterone antagonist + (α+ β) antagonist	01(100)

Figure 2: Co morbidities of Patients in the Study Population (n=206)



The patterns of antihypertensive prescriptions are shown in Table 4.

Of the 206 patients studied, 105 (50.97%) were on monotherapy, while 101 (49.03%) were on combination therapy (Table 1). Of the 101 patients on combination therapy, 96(95.04%), 4 (3.96%) and 1 (0.99%) were on 2, 3 and 4 drugs, respectively.

Among 206 patients the most frequently prescribed antihypertensive is calcium channel blocker either monotherapy (57.10% of monotherapy) or in combination with other antihypertensive drugs (76.23% of combination therapy), followed by ARBs either monotherapy (24.76% of

monotherapy) or in combination with other antihypertensive drugs (37.62% of combination therapy). Combination treatment usually consisted of two antihypertensive drugs administered as separate agents. The most common combination was CCBs plus BBs (45.83% of dual therapies), followed by CCBs plus ARBs (25% of dual therapies).

The baseline blood pressure tends to be higher as the number of drugs prescribed increases with the mean baseline blood pressures for patients on monotherapy and combination therapy being $142.61 \pm 17.93 / 87.73 \pm 8.19$ and $150.57 \pm 18.99 / 90.52 \pm 8.74$, respectively ($P < .05$ for both systolic and diastolic blood pressures) (Table 2). Patients on combination therapy achieved significantly higher reduction in systolic and diastolic blood pressures compared to those on monotherapy.

There was no significant difference in baseline blood pressures and mean reduction in follow-up blood pressures of patients on calcium channel blocker monotherapy, Angiotensin-II receptor blockers monotherapy, and Beta blockers monotherapy (Table 3).

Satisfactory blood pressure control was achieved in 133 (64.56%) patients. Blood pressure control was no better in patients with co-morbidities.

The physicians prescribing pattern was 75.73% compliance with the JNC-VIII guidelines (Fig.3).

CCBs either alone or in combination with other antihypertensives, was the most frequently used drug in these groups of patients, the frequency of use being 58.28%, 69.21%, 49.86% 40.00% and 83.33% of hypertensive patients with diabetes mellitus, stroke, CAD, MI and asthma respectively.

Angiotensin receptor blockers (ARBs), either monotherapy or as part of combination therapy were the second most frequently prescribed drugs in hypertensive patients with

co-morbid conditions. It was prescribed in 31.96%, 42.29%, 35.26%, 20.00%, and 16.66% of hypertensive patients with diabetes mellitus, and stroke, CAD, MI and asthma respectively (Table 4).

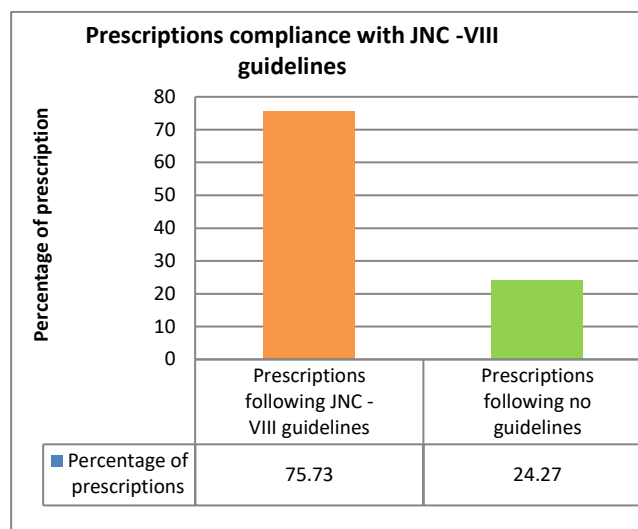


Figure 3: Percentage of prescriptions compliance to JNC-VIII guidelines

DISCUSSION

The high prescription rate of combination therapy was attributed to the high prevalence of patients with severe and moderate hypertension, and the presence of comorbid diseases, particularly diabetes mellitus. These findings are consistent with the recent trends advocating the use of combination therapy as a first line treatment. Our observation that patients on combination therapy had significantly higher reduction in systolic and diastolic blood pressures than those on monotherapy further confirm the previously described benefits of antihypertensive combination therapy.

Table 2: Comparison of patients on monotherapy and combination therapy

Category of blood pressure	Mono-therapy (n=105)	Dual-therapy (n=96)	p-value
Baseline mean SBP	142.61± 17.93	150.57±18.99	Significant
After 5 follow ups mean SBP	139.01±12.29	142.67±14.05	
Baseline mean DBP	87.73±8.19	90.52±8.74	
After 5 follow ups mean DBP	85.07±6.05	88.05±6.3	

SBP: Systolic blood pressure; DBP: Diastolic blood pressure

Table 3: Comparison of patients on CCBs, ARBs, BBs monotherapy

Category of blood pressure	CCBs (n = 60)	ARBS (n =26)	BBs (n=15)	p-value
Baseline mean SBP	142.73± 16.38	143.61±20.99	138.26±18.02	Not significant
After 5 follow ups mean SBP	139.86±12.14	138.40±13.89	137.11±11.28	
Baseline mean DBP	86.83±7.70	87.69±9.08	89.33±12.57	
After 5 follow ups mean DBP	84.73±6.06	85.84±7.62	85.87±6.19	

CCBs: Calcium channel blockers; ARBs: Angiotensin II receptor blockers; BBs: selective Beta blockers



Table 4: Pattern of anti-hypertensive drugs in hypertension patients with co-morbidities

DRUGS	DM	CVA	CAD	MI	ASTHMA
CCBs	29	9	1		3
ARBs	18	4	0		
BBs	7	0	3	1	1
ACEIs	2	1			
CCBS+ BBS	16	3	1		2
CCBS+ARBS	14	6	2	1	
CCBS+ACEIS	2	0	1		
CCBS+DIURETICS	1	0	1		
BBS +ARBS	1	0	1		
BBS+ACEIS	3	0	1	2	
ARBS+DIURETICS	1	0	1		
BBS+DIURETICS		1			
BBs + CCBs + DIURETICS				1	
ARBs + LOOP DIURETIC+ ALDOSTERONE ANTAGONIST+ ($\alpha+\beta$) ANTAGONIST		1			

The choice of CCBs or ARBs as the first line antihypertensive drug is consistent with current reports from India and in compliance with the current national and Joint National Committee (JNC) VIII guidelines. We observed low frequency of prescription of ACEIs as monotherapy. Furthermore, none of the patients in the study population was on Thiazide diuretics (or any diuretic) monotherapy, centrally acting drugs monotherapy. The frequency of prescription of CCBs was however high, in patients with comorbid conditions, followed by ARBs. Combination of greater than one agent at lower doses were showing better efficacy than a single agent at higher doses.

The first-line agent was influenced by comorbidity (e.g. diabetic patients more likely to receive ARBs/CCBs; Angina patients and patients after myocardial infarction more likely to receive beta-blockers).

The blood pressure (BP) control rate was 64.56% in the current report. Non-adherence, to treatment is the dominant factor contributing to inadequate BP control. In the current report we were unable to determine the actual drug adherence. It had been previously observed that blood pressure control rate was higher among clinic appointment compliant patients than the non-compliant ones. Hence, low compliant rate with clinic appointment suggests that poor compliance to medication which contributed to poor blood pressure control in the current report. We however recognized that clinic attendance does not necessarily imply adherence. It had also been previously observed that despite the benefits of combination therapy, too many drug combinations may adversely influence patients' adherence and blood pressure control. This may explain the apparent lack of significant further blood pressure reduction observed among patients on 3 or more drugs compared to those on 2 drug combinations in the current report.

CONCLUSION

Our observation was that the patients on combination therapy had significantly higher reductions in systolic and diastolic blood pressure than those on monotherapy and demonstrate that there is no significant difference in efficacy of Angiotensin II receptor blockers monotherapy, Calcium channel blockers monotherapy, and Beta blockers monotherapy in blood pressure lowering in the study population. Thiazide diuretics and ACE inhibitors were underutilized in this study, despite robust evidence to support their use. Evidence has also shown that simplifying the number of daily doses was effective in improving adherence.

Major limitation of this study was the inability to determine the actual patients' adherence to therapy. The duration of the study was only a period of 6 months. This study was conducted at a single hospital setup.

Despite the limitations of the available data, it can be concluded that the large majority of antihypertensive treatments prescribed in the present study were compliant with the Joint national committee-VIII guidelines.

Authors' Contributions: Dr. C. Gopinath and Dr. M. Sureswara Reddy were contributed to design, analysis, and interpretation of the results and writing of the manuscript. B.Niveditha, K. Phani, K. Prasanna Lakshmi, R. Venkata Anil Kumar are contributed to design, data collection, analysis, interpretation of the results and writing of the manuscript. All authors read and approved the final manuscript.

Acknowledgements: The authors would like to thank RAJIV GANDHI INSTITUTE OF MEDICAL SCIENCES, Kadapa.

Abbreviations Used: WHO-World Health Organization, JNC-VIII- Joint National Committee.

REFERENCES

1. <https://www.who.int/news-room/fact-sheets/detail/hypertension> (Accessed on 05-12-2019).
2. https://www.who.int/cardiovascular_diseases/world-hypertension-day-2019/en/ (Accessed on 04-12-2019)
3. Gautam B. Sawase, Sunayana G. Kumthekar, Shweta N. Salphale, Mohan K. Doibale. A study of prevalence of hypertension and socio-demographic factors in urban slum, Maharashtra. Int J Community Med Public Health. 6(2), 2019 Feb, 585-589.
4. E. Etuk, S. A. Isezuo, A. Chika, J. Akuche and M. Ali. Prescription Pattern of Anti- Hypertensive Drugs in a Tertiary Health Institution in Nigeria. Annals of African Medicine, Vol. 7, No.3, 2008, 128 – 132.
5. Lena Barrera, Craig Leaper, Utz J Pape, Azeem Majeed, Marta Blangiardo and Christopher Millett. Impact of ethnic-specific guidelines for anti-hypertensive prescribing in primary care in England: a longitudinal study Barrera et al. BMC Health Services Research, 14, 2014, 87.
6. World Health Organization, Available at: <http://apps.who.int/medicinedocs/en/d/Js4876e/> (Accessed on: 10/3/15)

Source of Support: Nil, **Conflict of Interest:** None.

