

DOI: <https://dx.doi.org/10.18203/2319-2003.ijbcp20221042>

Original Research Article

## Drug utilization study of anti-hypertensive drugs and prescription pattern adherence with joint national committee-8 guideline

Karan M. Suthar, Gurusharan H. Dumra\*

Department of Pharmacology, AMC MET Medical College, Ahmedabad, Gujarat, India

**Received:** 14 March 2022

**Revised:** 05 April 2022

**Accepted:** 06 April 2022

**\*Correspondence:**

Dr. Gurusharan H. Dumra,

Email: gurusharandumra@gmail.com

**Copyright:** © the author(s), publisher and licensee Medip Academy. This is an open-access article distributed under the terms of the Creative Commons Attribution Non-Commercial License, which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

### ABSTRACT

**Background:** Hypertension is a major and serious non-communicable disease. It is also a major risk factor for cerebrovascular strokes, coronary artery thrombosis, and renal failure. The overall prevalence of hypertension in India is 29.8%. Joint national committee-8 guidelines on prevention, detection, evaluation, and treatment of high blood pressure highlight that aggressive blood pressure control is essential for the reduction of hypertension-associated morbidity and mortality.

**Methods:** It was a cross-sectional, observational study. Prescriptions were collected from four pharmacy stores located in four different areas of Ahmedabad over a period of 2 months. These were analysed along with relevant comorbidities and, the level of prescription pattern adherence was assessed as per JNC 8 guidelines. Appropriate statistical tests were applied for analyses of collected data.

**Results:** A total of 321 prescriptions were collected. Out of them, 186 (57.9%) were prescribed to male patients while 135 (42.1%) were for female patients. Mean systolic and diastolic blood pressure was found to be 152 mmHg and 91 mmHg respectively. The mean age of the patients was found to be 44.63 years. A total of 209 (65.1%), 91 (28.34%), 21 (6.54%) prescriptions had monotherapy, dual therapy, and polytherapy for treating hypertension respectively. Amlodipine (CCBs) was found to be the most commonly prescribed medicine as a monotherapy. The overall adherence rate was found to be 77.88%.

**Conclusions:** The present study demonstrated that medical professionals are not completely adhering to standard guidelines while prescribing antihypertensive drugs. There is substantial scope for improvement, particularly the utilization of antihypertensive agents in patients of the pre-hypertension category, where non-pharmacological measures play an important role to treat the condition.

**Keywords:** JNC-8, Hypertension, Anti-hypertensive drugs, Prescription pattern, Adherence

### INTRODUCTION

In 1977, The world health organization (WHO) has defined drug utilization study as the marketing, distribution, prescription, and use of drugs in society with special emphasis on the developing medical, economic and social consequences.<sup>1</sup> Hypertension is one of the most common chronic non-communicable disease associated with high mortality and morbidity.<sup>2</sup>

Uncontrolled hypertension may lead to different organ-related morbidities like heart (left ventricular hypertrophy, heart failure, angina pectoris, etc.); cerebrovascular (transient ischemic attack, stroke, etc.); renal (nephrosclerosis, renal failure, etc.) and also hypertensive retinopathy.<sup>3</sup> Globally cardiovascular diseases are responsible for approximately 17 million deaths a year, which is nearly one-third of the total deaths.<sup>4</sup> Out of all these, complications of hypertension

account for 9.4 million deaths worldwide every year.<sup>5</sup> Overall prevalence of hypertension in India was found to be 29.8% with a 95% of confidence interval (26.7-33) consisting of 33% and 25% of prevalence in urban and rural areas respectively.<sup>6</sup> Prescribing drugs for hypertension is complex. Several factors such as comorbidities, polypharmacy, pharmacokinetic, pharmacodynamic properties, and patient noncompliance make this a high-risk group from drug safety concern.<sup>7-9</sup> A wide range of antihypertensive drugs in various combinations are available for efficient management of hypertension.<sup>10-12</sup> Different pharmacological as well as non-pharmacological interventions have been suggested by various guidelines to control hypertension. One such guideline is JNC-8 (joint national committee-8) suggesting that aggressive blood pressure control is essential for reducing hypertension associated morbidity and mortality. We decided to conduct this study with the aim to assess the pattern of drug utilization for anti-hypertensive drugs and to evaluate prescription pattern adherence with JNC-8 guidelines.

### JNC-8 guidelines

The joint national committee (JNC-8) is accounted the “gold standard” consensus for the treatment of hypertension.<sup>4</sup> In compare to the 2003 JNC 7 guideline recommendation, the 2014 guideline is governed by a systematic review of clinical trial evidence.<sup>13,14</sup> A 2014 report from panel members of the eighth joint national committee (JNC-8) recommended that in patients aged  $\geq 60$  years, blood pressure should be maintained to  $<150/90$  mm Hg, while  $<140/90$  mm Hg for patients aged

$<60$  years.<sup>13</sup> JNC-8 guideline offers recommendations for the treatment of hypertension in patients older or younger than age of 60 years, patients aged  $\geq 18$  years with diabetes, patients aged  $\geq 18$  years with chronic kidney disease and black and nonblack populations.

### METHODS

This was a cross-sectional, observational, and non-interventional study. Prescriptions were collected and analysed from four pharmacy stores located in four different areas of Ahmedabad. Prescription pictures were captured and out of all the collected prescriptions only those prescriptions having the name and signature of RMP (registered medical practitioner), patient’s vital history, details regarding co-morbidities, and antihypertensive agents were analysed along with prescription pattern adherence as per JNC 8 guidelines. The data collection was done for a period of 2 months (November 2020 - December 2020). Confidentiality of the patient’s identity was maintained while the collection of the data. Data collection was done for a study period of 2 months. Data collected over stipulated time was entered into Microsoft Excel 2019 and appropriate statistical tests were used to analyse the data.

### RESULTS

A total of 321 prescriptions were collected. Out of them, 186 (57.9%) were prescribed to male patients while, 135 (42.1%) were for female patients. Mean systolic and diastolic blood pressure was found to be 152 mmHg and 91 mmHg respectively.

**Table 1: Demographic and blood pressure data.**

Variables		Mean $\pm$ SD	N (%)
Gender	Males	-	186 (57.9)
	Females	-	135 (42.1)
	Total	-	321 (100)
Age (years)	Males	44.63 $\pm$ 9.48	
	Females	44.59 $\pm$ 9.49	
Age groups (years)	21-30	-	21 (6.54)
	31-40	-	94 (29.28)
	41-50	-	112 (34.89)
	51-60	-	76 (23.67)
	61-70	-	18 (5.6)
Systolic blood pressure (mmHg)	-	151.62 $\pm$ 11.41	-
Diastolic blood pressure (mmHg)	-	90.88 $\pm$ 6.65	-

The mean age of the patients was found to be 44.63 years. Also, we observed that a maximum number of prescriptions (N=112) were prescribed to patients within the age group of 41-50 years, whereas a total of 18 prescriptions were prescribed to patients within the age group of 61-70 years (Table 2).

According to JNC-8 criteria, out of total 321 patients with hypertension, 33 (10.28%), 188 (58.56%), and 100 (31.15%) patients were found to be having prehypertension, stage-1 hypertension, and stage-2 hypertension, respectively (Table 3). Out of total 188 patients of stage-1 hypertension, 99 (52.65%) were males while 89 (47.35%) were females (Table 3).

**Table 2: Distribution of cases according to JNC-8 criteria**

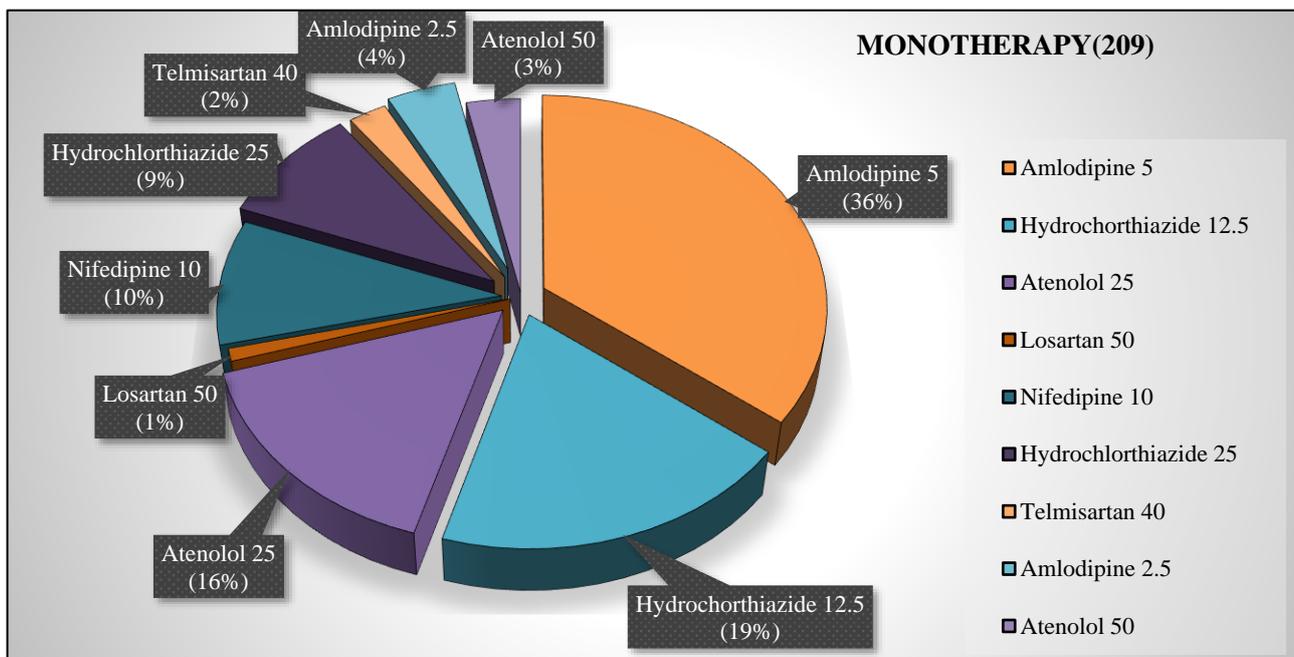
JNC-8 classification	N (%)	Males N (%)	Females N (%)
Pre-hypertension	33 (10.28)	23 (69.69)	10 (30.31)
Stage-1 hypertension	188 (58.56)	99 (52.65)	89 (47.35)
Stage-2 hypertension	100 (31.15)	64 (64)	36 (36)
<b>Total</b>	<b>321</b>	<b>186</b>	<b>135</b>

**Table 3: Drugs utilized as dual and poly therapy.**

Therapy	Drugs utilized (dosage)	N
Dual therapy	Amlodipine 5 + Atenolol 50	2
	Amlodipine 5 + Enalapril 2.5	11
	Amlodipine 5 + Hydrochlorothiazide 12.5	18
	Amlodipine 5 + Lisinopril 5	2
	Furosemide 20 + Spironolactone 50	7
	Losartan 50 + Atenolol 50	5
	Losartan 50 + Hydrochlorothiazide 12.5	13
	Telmisartan 40 + Amlodipine 5	8
	Telmisartan 40 + Hydrochlorothiazide 12.5	15
	<b>Total</b>	<b>91</b>
Poly therapy	Telmisartan 40+ hydrochlorothiazide 12.5+amlodipine 5	21

**Table 4: Drugs utilized as dual and poly therapy.**

Hypertension category (N)	Prescription pattern adherence		Total	P value
	Adherence N (%)	Non-adherence N (%)		
Pre-hypertension (33)	4 (12.12)	29 (87.88)	33	<0.001
Stage-1 hypertension (188)	151 (80.31)	37 (19.69)	188	
Stage-2 hypertension (100)	95 (95)	5 (5)	100	
<b>Total</b>	<b>250</b>	<b>71</b>	<b>321</b>	



**Figure 1: Antihypertensive drugs prescribed to patients receiving monotherapy.**

Out of total 321 patients, 3 patients had CKD (chronic kidney disease), 22 patients had COPD (chronic obstructive pulmonary disease), and 18 had DM (diabetes mellitus) as a co-morbidity. We observed that out of total 321 prescriptions, 209(65.1%) prescriptions had monotherapy, 91 (28.34%) had dual therapy, and 21 (6.54%) had polytherapy for treating hypertension. Out of all the prescriptions having monotherapy as a treatment, amlodipine 5mg (CCBs) was found to be prescribed in 36% of patients, followed by Hydrochlorothiazide 12.5mg (diuretic) prescribed in 19% of the patients. The least prescribed drug as monotherapy was found to be atenolol 50mg ( $\beta$ -blocker) in 3% of the patients (Figure 1). Our results show that various groups of drugs were utilised including CCBs+ $\beta$ -blocker, CCBs+ACEI, CCBs+diuretic, diuretic+diuretic, ARBs+ $\beta$ -blocker, ARBs+diuretic, and ARBs+CCBs as dual therapy. Amlodipine and Hydrochlorothiazide (CCBs+diuretic) combination was found to be prescribed in a total of 18 patients. The combination used as polytherapy was telmisartan+hydrochlorothiazide+amlodipine (ARBs+Diuretic+ $\beta$ -blocker) (Table 4). Out of all the collected prescriptions (N=321), a total of 250 prescriptions had drugs prescribed as per the JNC-8 guideline. The adherence rate was 12.12% (pre-hypertension); 80.31% (stage 1 hypertension); and 95% (stage 2 hypertension) (Table 5). An association was found to be significant ( $p < 0.001$ ) between various hypertension categories and the adherence rate of prescription patterns as per JNC-8 guidelines. Overall prescription pattern adherence rate was found to be 77.88%.

## DISCUSSION

A prescription survey is one of the most efficient methods to estimate and measure the prescribing pattern of medical professionals and dispensing tradition of pharmacists.<sup>15</sup> Selection of an antihypertensive agent should be decided by likely benefit in an individual patient, taking into account concomitant diseases such as COPD or DM, worrisome adverse effects of specific drugs, and cost. To improve the standard of prescribing patterns and to promote the rational use of drugs, it is necessary to take into consideration the guidelines of international regulatory bodies.

Results of our study population show that hypertension is more prevalent in elderly patients belonging to the age group 41-50 years (34.9%). A study conducted by Tiwari et al found that the prevalence of hypertension is most common in the age group of 50-59 years (33.3%) followed by 60-69 (26.7%) years and 40-49 years (26.7%).<sup>16</sup> Furthermore, in our study population, we observed that 3(0.93%) patients had CKD (chronic kidney disease), 22(6.85%) patients had COPD (chronic obstructive pulmonary disease), and 18(5.6%) had DM (diabetes mellitus) as a co-morbidity. A study done by Sakthi S et al reported a total of 5% of patients had COPD and 35% had DM as a co-morbidity.<sup>17</sup>

In our study, a total of 209 (65%) patients were prescribed monotherapy. Among them, 83 (25.85%) patients were prescribed with Amlodipine as a monotherapy to treat hypertension. In a study done by Mohd et al the most commonly prescribed agent among elderly patients was Amlodipine.<sup>18</sup> Similarly in a study done by Kaur S et al. calcium channel blockers (CCBs) and angiotensin converting enzyme inhibitors (ACE Inhibitors) were the most commonly prescribed agents followed by beta-blockers.<sup>19</sup> The similar pattern is observed in a study done by Hong Cheng et al wherein most of the patients were prescribed with calcium channel blockers.<sup>20</sup>

A total of 91 (28.34%) and 21 (6.54%) patients were prescribed with dual therapy and polytherapy respectively. A similar study done by Sikidar et al shows that 90 patients (30%) received dual therapy and 9 patients (3%) received polytherapy.<sup>2</sup> Out of total 91 dual therapy and 21 polytherapy prescriptions, the most commonly prescribed combination was found to be CCBs+diuretic (19.78%) and ARBs+diuretic+ $\beta$ -blocker (100%) respectively. While a study reported by Essam et al, the most commonly prescribed dual therapy and polytherapy combination was found to be CCB+ $\beta$ -blocker (21%) and ARBs+diuretic+ $\beta$ -blocker (21.2) respectively.<sup>21</sup> Selection of drugs may be influenced by several factors such as recent guidelines (i.e. JNC-8) cardiovascular risk factors, socio-economic factors, co-morbidities, patient's age, compliance and drug-drug interactions.

## Limitations

Limitations of current study were; it was a quantitative study with small sample size and we did not include follow up data of prescriptions to observe the effects of various antihypertensive agents on hypertension.

## CONCLUSION

It has been proved that prescribing guidelines should be followed for improvement in health outcomes of the patients suffering from hypertension because these guidelines are based on vigorously conducted clinical trials. The present study demonstrated that medical professionals are not completely adhering to standard guidelines while prescribing antihypertensive drugs. There is substantial scope for improvement, particularly the utilization of antihypertensive agents in patients of the pre-hypertension category, where non pharmacological measures play an important role to treat the condition. Also, several prescriptions were having  $\beta$ -blockers only, which is no longer considered as first a first-line agent. Various CME and seminars should be conducted at regular intervals to keep the medical professionals updated about the latest treatment guidelines.

*Funding: No funding sources*

*Conflict of interest: None declared*

*Ethical approval: The study was approved by the Institutional Ethics Committee*

## REFERENCES

1. Truter I. A review of drug utilization studies and methodologies. *Jordan J Pharm Sci.* 2010;1(2):91-104.
2. Sikidar P, Chakravarty P, Purkayastha A, Tigga R. A study on prescribing pattern of antihypertensives in adult patients attending in a tertiary care hospital of Assam, India. *Int J basic Clin Pharmacol.* 2016;5(3): 975-8.
3. Cushman WC. The Burden of Uncontrolled Hypertension: Morbidity and Mortality Associated With Disease Progression. *J Clin Hypertens.* 2003; 5(3):14-22.
4. Romday R, Gupta A, Bhambani P. An assessment of antihypertensive drug prescription patterns and adherence to joint national committee-8 hypertension treatment guidelines among hypertensive patients attending a tertiary care teaching hospital. *Int J Res Med Sci.* 2016;4(12):5125-33.
5. Lim SS, Vos T, Flaxman AD, Danaei G, Shibuya K, Adair-Rohani H, et al. A comparative risk assessment of burden of disease and injury attributable to 67 risk factors and risk factor clusters in 21 regions, 1990-2010: A systematic analysis for the Global Burden of Disease Study 2010. *Lancet.* 2012;380(9859):2224-60.
6. Anchala R, Kannuri NK, Pant H, Khan H, Franco OH, Di Angelantonio E, et al. Hypertension in India: A systematic review and meta-analysis of prevalence, awareness, and control of hypertension. *J Hyper.* 2014;32:1170-7.
7. Munger MA. Polypharmacy and combination therapy in the management of hypertension in elderly patients with co-morbid diabetes mellitus. *Drugs Aging.* 2010; 27:871-83.
8. Ginsberg G, Hattis D, Russ A, Sonawane B. Pharmacokinetic and pharmacodynamic factors that can affect sensitivity to neurotoxic sequelae in elderly individuals. *Environ Health Perspect.* 2009;32:1243-9.
9. Cooney D, Pascuzzi K. Polypharmacy in the elderly: focus on drug interactions and adherence in hypertension. *Clin Geriatr Med;* 2009;22:221-33.
10. Hansson L, Dahlöf B, Gudbrandsson T, Hellsing T, Kullman S, Kuylensstierna J, et al. Antihypertensive effect of felodipine or hydralazine when added to  $\beta$ -blocker therapy. *J Cardiovasc Pharmacol.* 2020;12(1): 94-101.
11. Kjeldsen SE, Farsang C, Sleigh P, Mancia G. 1999 who/ish hypertension guidelines - highlights & esh update. *J Hypertens.* 2001;19(12):151.
12. Ramsay LE, Williams B, Johnston GD, MacGregor GA, Poston L, Potter JF, et al. British Hypertension Society guidelines for hypertension management 1999: Summary. *BMJ.* 1999;630-5.
13. James PA, Oparil S, Carter BL, Cushman WC, Dennison-Himmelfarb C, Handler J, et al. 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;507-20.
14. Chobanian AV, Bakris GL, Black HR, Cushman WC, Green LA, Izzo JL, et al. Seventh report of the joint national committee on prevention, detection, evaluation, and treatment of high blood pressure. *hypertens.* 2003;32:1206-52.
15. Yhy Y, Liu C, Hu L. Drug utilization in a hospital general medical outpatient clinic with particular reference to antihypertensive and antidiabetic drugs. *J Clin Pharm Ther.* 1998;23(4):287-94.
16. Tiwari H, Kumar A. Prescription monitoring of anti-hypertensive drug utilisation at the Panjab University Health Centre in India. *Citeseer.* 2021.
17. Sakthi S, Thomas S, Sivakumar KK, Karhikeyan J, Saravana A. Antihypertensives. *J Clin Pharm Ther.* 1998;23(4):285-94.
18. Mateti UV, Konuru V, Parmar MY, Kunduru BR. A study on prescribing patterns of antihypertensives in geriatric patients. *Perspect Clin Res.* 2012;3(4):139.
19. Kaur S, Gupta S, Kumar D, Lal M. Prescribing pattern of antihypertensive drugs in a tertiary care hospital in Jammu-A Descriptive study. *Perspect Clin Res.* 2012; 17(4):38-41.
20. Liu C, Hu L. Prescribing pattern of antihypertensive drugs in a general hospital in central China. *J Clin Pharm Ther.* 1998;23(4):285-94.
21. AlDrabah E, Irshaid Y, Yasein N, Zmeili S. Prescription pattern of antihypertensive drugs in family practice clinics at Jordan University Hospital. *Med Sci Int Med J.* 2013;2(1):469.

**Cite this article as:** Suthar KM, Dumra GH. Drug utilization study of anti-hypertensive drugs and prescription pattern adherence with joint national committee-8 guideline. *Int J Basic Clin Pharmacol* 2022;11:262-6.