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## **Drug Utilisation Pattern of Antihypertensive Drugs**

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**Conflicts of Interest:** Nil

# Abstract

**Background**: The antihypertensive drugs used for the management of hypertension constitute a significant portion of the medicines prescribed in a health care centres.Our study aimed to find out the most commonly prescribed antihypertensive drugs in study patients with or without other comorbidity/s.

Material and Method: A Prospective observational study was carried out on 200 hypertensive patients with or without other chronic co-morbidity/s of age 20-80 years visiting outpatient department of Medicine at Maharishi Markandeswar Institute of Medical Science and Research,Haryana, India. Ethical clearance was taken prior to the start of the study and patient's informed written consent was obtained. All the relevant data was collected from the prescription card of the patient on a preformed Performa and analyzed using descriptive statistics. **Result:** Total of 301 antihypertensive drugs were utilized during study period among which monotherapy(55.5%) was mostly used followed by combination therapy (39.5%). The most common group prescribed was calcium channel blocker (23.92%) and the most frequent Fixed Drug Combination as per group was ACE inhibitor + thiazide diuretic (20.23%) followed by ARB + thiazide diuretic (19.1%). Among all the antihypertensive drugs, amlodipine was the highest used (19.94%) and diabetes mellitus (28.7%) was the most recurrent co-morbidity observed in patients.

**Conclusion:** Calcium Channel Blocker was the most common drug group and ACE inhibitor + thiazide was the most frequent FDC prescribed. Prescriptions evaluation revealed that most of the prescription were rational and were in accordance with the JNC-8 treatment guidelines. **Keywords:** Drug Utilsation Pattern, Antihypertensive Drugs, Amlodipine, Hypertension

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Hypertension continues to be an important public health concern because of its associated morbidity, mortality and economic impact on the society. It is a significant risk factor for cardiovascular, cerebrovascular and renal complications. It has been estimated that by 2025, 1.56 billion individuals will have hypertension.[1]. The increasing prevalence of hypertension has been attributed to population growth, ageing and behavioral risk factors, such as unhealthy diet, excess use of alcohol, sedentary lifestyle, obesity, and exposure to persistent stress .[2]

Complications of hypertension are direct or indirect clinical outcomes that result from persistent elevation of blood pressure.[3] It is an predisposing factor for heart failure, coronary artery disease, stroke, renal disease.[4] Hypertension is also independently associated with the risk of gout through reduced renal blood flow with increased renal and systemic vascular resistance which leads to decreased renal excretion of urate.[5]

Many pathophysiologic factors have been implicated in the genesis of essential hypertension: increased sympathetic nervous system activity, psychosocial stress; overproduction of vasoconstrictors; long-term high sodium intake; increased or inappropriate renin secretion and aldosterone; insulin resistance; alterations in adrenergic receptors and vascular tone.[6]

High blood pressure is classified as either primary (essential) high blood pressure or secondary high blood pressure. About 90–95% of cases are primary, defined as high blood pressure due to nonspecific lifestyle and genetic factors. The remaining 5–10% of cases are categorized as secondary high blood pressure, defined as high blood pressure due to an identifiable cause, such as chronic kidney disease, narrowing of the kidney arteries, an endocrine disorder, or the use of birth control pills.[7]

Hypertension is rarely associated with any obvious sign/symptom and thus it is also known as silent killer.[8]

Symptoms such as epistaxis ,anxiety, palpitation ,vomiting etc are more pronounced and obvious in case of extremely elevated blood pressure (hypertensive emergency and hypertensive urgency.[9].

Since the need to treat hypertension is of special concern, several guidelines on its classification and management have been developed. The JNC 8 guidelines published in 2014 is the most recent guidelines for the management of hypertension in different clinical settings

Treatment for hypertensive patients includes both nonpharmacologic (lifestyle changes, dietary changes) and pharmacologic (medication) therapy to lower blood pressure and prevent cardiovascular events such as a heart attack, stroke. There are many classes of antihypertensives, which lower blood pressure by different means. Non-Pharmacological interrventions should be used throughout the management of all patients with high blood pressure<sup>9</sup>. Among the most important and most widely used antihypertensive drugs are ACE inhibitors, angiotensin Π receptor antagonists(ARBs), thiazide diuretics, calcium channel blocker and beta blockers. The several classes of antihypertensives differ in side effect profiles, efficacy ability to prevent complications, and cost.<sup>11</sup>

#### Material & Methods

### A. Study Design And Site

A Prospective observational study was carried out on patients visiting the outpatient department of Medicine of Maharishi Markandeshwar Institute of Medical Science and research, Mullana, Haryana after obtaining Ethical Certificate from Institute of Ethical Committee.

#### **B. Study Population And Sample Size**

The study was conducted on 200 hypertensive patients of age 20-80 years visiting the department of Medicine of Maharishi Markandeshwar Institute of Medical Science and Research-a teriary care teaching hospital as per

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inclusion criteria. All the patients were clearly explained about the nature of the study and their written consent was taken.

## C. Study Methodology And Data Collection

Antihypertensive drug/s prescribed by the Physician to the patient was noted down mentioning the class, dose, frequency and duration from the patient's prescription card in a preformed performa. Beside the antihypertensive drugs, the demographic information and Preliminary medical history (Present complain, smoking, alcoholism, presence of other disease, drug history, family history of disease) was also inquired with them directly and noted. Blood Pressure values as per JNC-8 criteria was considered for the diagnosis of patient for hypertension BP and reading was recorded by using sphygnomanometer keeping the patient in sitting position.

# **D.** Inclusion Criteria

▶ Hypertensive patient between age of 20-80.

Hypertensive patient of both gender (male & female).

Patients taking antihypertensive drugs prescribed by the physician during the study period.

Hypertensive patient with or without other co-existing disease/morbity.

### E. Exclusion Criteria

- Patient treated for hypertensive urgency & emergency
- Pregnant woman suffering from hypertension
- Hypertensive patient not giving informed written consent.

# F. Statistical Analysis and Data Assessment

The data obtained from the observation was categorized and tablulated in terms of number and percentage on microsoft excel worksheet. Analysis was performed using IBM-SPSS (International Business Machine with Statistical Package for the Social Sciences) version 21. The final results achieved were analysed using descriptive statistics and graphically presented via bar chart, column chat and pie chart wherever necessary.

#### **Result And Discussion**

Our study found that male patients suffering from hypertension were greater (67.68%) than the female patients (33.52%) as shown in **Table 1**. This result of our study matches a lot by the result of a similar chinese study by Cheng et al [13] where they also observed male patients to be higher (68.6%) than their female counterparts (31.4%). However a related indian study by Krunal C et al [14] reported female population to be higher (56.1%) than the males (43.83%).

According to our present study, 55.5% of patients were treated with single drugs and 39% were on on two drug while patients taking three drugs were 5.5% (**Figure 1**). The observation of this study was supported by a similar study by konwar et al [15] conducted on 270 hypertensive patients in 2014 where they noted that 70.37% patients were prescribed one drug. But Khurshid et al [16] in their observation study carried out on 192 hypertensive patients found combination therapy to be more common (54.6%) than monotherapy (45.4%)

While comparing the utilization of antihypertensive drug class, our study shows that among all the class, **Calcium channel blocker** (23.92%) is the most frequently prescribed followed by Angiotensin converting enzyme inhibitors (21.6%) which is then followed by Angiotensin receptor blocker (20.6%). Thiazide diuretics (14.28%) and beta blockers (13.28%) were moderately prescribed while loop diuretic and aldosterone antagonist were were minimal in use (both 2.64%) and alpha<sub>1</sub> blocker (1%) was the least prescribed (**Table 2**).

A similar study on drug utilization pattern was conducted by Alavuddin et al [17] in 2015 at Family Medicine hospital, Saudi arabia and result obtained by them matches a lot with our study. They also found

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calcium channel blocker (43%) as the most commonly utilized drug class followed by Angiotensin converting enzyme inhibitor (36.2%) and then Angiotensin receptor blocker (34.9%). In 2011 Cheng et al [13] conducted a study to evaluate the prescribing trend at zhongnam hospital, central china and also observed Calcium channel blocker (58%) as the most used drug class. The increasingly use of CCB may be because of its better ability to control hypertension with least side effects. However Khaja et al [18] in a prescription based survey conducted in bahrain found beta blockers (65.5%) to be the most common antihypertensive drugs utilized by the physicians.

A total of 301 drugs were prescribed to 200 patients in our study and amlodipine (20%) was the most prescribed drug both in monotherapy and combination therapy followed by telmisartan (15%) ,hydrochlorothiazide (14.28%) and ramipril (12.62%) while verapamil (1.32%)and prazosin (1%), were the least prescribed drugs (Figure 2). Altaf et al [19] in 2014 also concluded amlodipine (37%) to be most common drug after accessing the utilization pattern of antihypertensive drugs on 100 patients at owaisi hospital ,Hyderabad of india. A related study carried out by Anju et al [20] in 2015 also reported amlodipine (60%) to be the most widely used from among the study patients. But again Shukrala et al [21] in a smilar study carried out on 400 patients suffering from hypertension in 2015 at hiwot fana specialized hospital, Ethiopia, found hydrochlorothiazide (55%) to be the most utilized antihypertensive drug. As per the observation drawn in our study, ACE inhibitor + Thiazide diuretic (20.22%) was the most frequent drug combination which is very closer to ARB + Thiazide diuretic (19.1%) followed by ACE inhibitor + B blocker (17.97%) and others. (Table 3). Nearly similar result was obtained by An et al [22] in a cross sectional study

where they found ACE inhibitor + diuretic as the common fixed dose drug combination prescribed by the practioners. However, **Alavuddin et al** [17] in their study on 149 hypertensive individuals at Family medicine hospital, Saudi arabia in 2015 found CCB + ARB (25%) as the highest utilized FDC.

In our present study, we found 57.5% of the total patient were suffering from other co-morbid conditions and diabetes mellitus (28.6%) was the most widespread among all followed by dyslipidemia (20.86%), renal disorders (14.7%) and others (Figure 3). The result obtained in our study is quite supported by another 2014 indian study carried out by Pavitra et al [23] on 120 hypertensive subjects where they also observed diabetes mellitus (45%) as the most common comorbidity. Similarly Shukrala et al [21] in their 2015 study also concluded diabetes mellitus as most commonest comorbidity seen in hypertensive patients. The most probable reason of higher incidence of diabetes mellitus in hypertensive patient could be the altered metabolic pathway in cells and tissues attributed to of high blood pressure thus increasing the likelihood of suffering from metabolic disorders such as diabetes mellitus

#### **Tables and Figures**

Table 1: Comparative Distribution of Study Patientsas Per Their Gender

Gender	Number (n=200)	Percentage (%)
Male	136	67.68
Female	64	33.52

Table	2:	Comparative	Distribution	of	Anti-

Hypertensive Drug Class/Group Utilized In the Study

Drug Class	Number(n=301)	Percentage (%)	
ACE inhibitors	65	21.6	
Calcim Channel	72	23.92	
Blockers			
	•	•	

Beta blockers	40	13.28
ARB		20.6
Thiazide diuretic	43	14.28
Loop diuretics	8	2.65
Aldosterone	8	2.64
antagonist		
Alpha blockers	3	1

Table 3:	Comparative	Distribution	of Drug	Classes	as
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# **Per Fixed Dose Combination**

Fixed Drug Combination	Number	Percentage
	(N=89)	(%)
CCB + Thiazide Diuretic	5	5.62
Ace Inhibitors + CCB	10	11.24
ACE Inhibitors + Thiazide	18	20.23
ARB + CCB	8	8.98
ARB + Thiazide. Diuretic	17	19.1
CCB + Beta Blocker	8	8.98
Ace Inhibitors + Beta	16	17.97
Blocker		
Thzd Diuretic +	2	2.25
Aldosterone. Antagonist		
Loop + Aldosterone	5	5.63
Antagonist		

**Figure 1:** Percentage distribution of patients as per the form of therapy provided to them







**Figure 3:** Percentage distribution of various comorbidity among hypertensive patient.



# Conclusion

Monotherapy was observed to be higher than combination therapy in the study. Calcium channel blocker was the most commonly utilized drug class and ACE inhibitors + thiazide diuretic was the most common fixed drug combination prescribed to the study patient . Among all the antihypertensive drugs, amlodipine was found to be most frequently prescribed both in monotherapy and in combination therapy. The common recurrent comorbidity observed in the study patient was diabetes mellitus followed by dyslipidemia. Analysation of the result revealed that most of the prescription were rational and were in accordance with JNC-8 treatment guidelines.

## References

[1] . Noah, Rao Narasinga, Peela Jagannadha Rao, Ellafi

Khaled A, Shakila Srikum, Said Abdul et al, "A review

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on prescribing patterns of antihypertensive drugs", Clinical Hypertension.vol. 22, no. 7, 2016

[2]. L. Stephen S , T. Vos, A. D. Flaxma, G. Danaei, K. Shibuya, H.A. Rohani - 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. Vol.380, 2012 , p. 2224–6

[3].WB. White, "Defining the problem of treating the patient with hypertension and arthritis pain", The American Journal of Medicine, Vol. 122, no.5, 2009

[4]. KK. Gaddam, A. Verma, M. Thompson, R. Amin, H. Ventura, "Hypertension and cardiac failure in its various forms," The Medical Clinics of North America. Vol. 93, no.3, 2009

[5]. S. Nidhi, Walia Rani, S. Akshay, "Antihypertensive drugs and risk of gout among patients with hypertension", Global Journal of Pharmaceutical Education and Research. Vol. 2, no-1,2015, p.19-2

[6].O. Suzanne, M. Z. Amin, A.C. David, "Pathogenesis of Hypertension", Ann Intern Med.vol. 139, 2003, p.761-776

[7]. N.R. Poulter, D. Prabhakaran, Caulfield,"Hypertension", Lancet. Vol. 386, no. 9995, 2015, p.801–12

[8].B. Kayce, T. June, Olin Bernie R, "Hpertension", the silent killer-updated JNC 8 guidelines recommendation. APA . 2015

[9]. L. Thomas, "Managing hypertensive emergencies in the Emergency Department. Canadian Family Physician", Vol. 57, no. 10, 2011, p. 1137–97.

[10].J. Paul A, O. Suzzane, B.L. Carter, C. C. William, C.D. Himmelfarb, Joel Handler 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. Vol.311, no.5, 2014, p.507–520.

[11]. M.Nelson , "Drug treatment of elevated blood pressure", Australian Prescriber, Vol.33, no.4, 2010, p. 108–112.

[12]. K. Balbir, W. Rani , "Prescription audit for evaluation of prescribing pattern of the doctors for rational drug therapy in a tertiary care hospital", Journal of Drug Delivery & Therapeutics, Vol 3, no.5, p. 77-80

[13].Cheng, "Prescribing pattern of antihypertensive drugs in a general hospital in central China", International Journal of Clinical Pharmacy, vol. 33, no.2, 2011, p.215-220

[14]. S. C.Krunal, M.A. Rusva, S. S.A Singh, J.P. Shilpa, P.M. Nirav, T.R. Hiren, "Drug utilization study of antihypertensive drugs and their adverse effects in patients of a tertiary care hospital", J Clin Exp Res. Vol.1,no.3, 2013, p. 56-67

[15].K.Mahanjit, P.K. Pranab, D. Swarnamoni,"Drug utilization study of anti-hypertensive drugs and their adverse effects in patients of a tertiary care hospital", Asian journal of Pharmacy & Pharmaceutical Science, vol.7, no.2, 2014

[16].Khurshid, M. Aqil, M.S. Alam, K. Prem and P.K. Krishna , "Antihypertensive medication Prescribing patterns in a university teaching hospital in South delhi", Internanational Journal of Pharmaceutical Science and Research, Vol.59, no.2, 2000; p.51-12

[17].S. S. Alavudeen, A. M. Khaled, A.M.Asif, A.A. Noohu, "Prescribing pattern of antihypertensive drugs in diabetic patients of Southern Province, Kingdom of Saudi Arabia", Ars Pharm,vol.56, no.2, 2015, p.109-114

[18].K. Khaja, R.P Sequeira, A.W.Wahab, V.S.Mathur, "Antihypertensive drug prescription trends at the primary health care centres in Bahrain",Pharmacoepidemiol Drug Saf. Vol.10,no.3, 2001, p. 219-27

© 2016 IJMSIR, All Rights Reserved

[19].M. Altaf, A. rasheed, M.Arshia, M.*Shaik*, "Drug utilization evaluation of antihypertensives in geriatric patients in a tertiary care hospital", International Journal of Pharmacy and Pharmaceutical Sciences, Vol. 6, no.9, 2014.

[20].M.Anju, G Dharmender, S.Sujata, N. A. Ansari, "Study of drug uitlization pattern of antihypertensive drugs in hypertensive nephropathy in a tertiary care teaching hospital, bareilly, u.p", Indian Journal of Pharmacy and Pharmacology, Vol. 2, no.1, 2015, p. 10-15 [21].S. Fedila, G. Tesfaye, "Assessment of prescribing, dispensing, and patient use pattern of antihypertensive drugs for patients attending outpatient department of Hiwot Fana Specialized University Hospital, Harar, Eastern Ethiopia". Dovepress. Vol.9, 2015, p. 519-523

[22].K.Anand, M.Yasmeen, Prescribing Patterns of Antihypertensive Drugs in a Tertiary Care Hospital. Sch. Acad. J. Pharm., 2013; 2(5):416-418

[23]. R.Y.Pavitra R Y, M.Geetha , A.Rajeev , H.S. Somashekar, "Drug utilization pattern of antihypertensive drugs in chronic kidney disease patients in a tertiary care hospital", Journal of Dental and Medical Sciences , vol.13, no. 11, 2014, p. 23-27