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Original Research Article

## Drug utilization study in patients of hypertension in tertiary care hospital

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### ABSTRACT

**Background:** Hypertension is the most common modifiable risk factor for cardiovascular diseases, stroke and renal failure. Drug utilization research facilitates the rational use of drugs and provides an insight into the pattern of drug use. As such, the present study was conducted to assess the prescribing patterns of antihypertensive agents and to observe the disparity between the recommended and actual practices for pharmacological management of hypertension at a tertiary care hospital.

**Methods:** A prospective, observational and cross-sectional study was conducted in Department of Pharmacology in collaboration with Department of Medicine in a tertiary healthcare hospital. As per inclusion criteria, patients with hypertension visiting Medicine OPD from 1st October 2018 to 31st December 2018 were enrolled in the study.

**Results:** A total of 390 prescriptions were collected. It was observed that majority of the study patients were female (53.84%) and were >60 years of age. Average number of drugs prescribed per prescription was 4.18. Multiple drug regimen (67.69%) was the mainstay therapy in our study. Prevalence of two drug combination was the highest (46.92%) followed by monotherapy (32.3%). Calcium channel blockers (CCBs) (amlodipine) was the most frequently prescribed class in monotherapy (19.23%). In two drug regimens, the combination of CCB with angiotensin-converting enzyme inhibitors (ACEIs) (combination of amlodipine and enalapril) was prescribed the most (28.46%) whereas prescription of combination of ACEI, beta-blocker (BB) and CCB (enalapril, atenolol and amlodipine combination) was the highest (13.84%) in three drug regimens.

**Conclusions:** The prescription pattern of antihypertensive drugs was found to be rational and mainly in accordance with Joint National Committee VIII guidelines. All the drugs were prescribed by their generic names which suggests awareness among prescribers regarding WHO policies for generic prescribing.

**Keywords:** Prescription, Hypertension, Antihypertensive drugs, Polypharmacy

### INTRODUCTION

Hypertension (HTN) is a major health problem worldwide causing significant morbidity and mortality. A large proportion of individuals are affected by it in both developed as well as developing nations.<sup>1,2</sup> HTN is associated with an increased risk of various diseases such as myocardial infarction, heart failure, stroke, retinopathy

and renal failure.<sup>3,4</sup> Elevated blood pressure (BP) is responsible for nearly 7.5 million deaths or 12.8% of the total annual deaths globally.<sup>5</sup> According to the World Health Organization (WHO) estimates, 1.5 million people are predicted to be hypertensive by 2025.<sup>6</sup> In Indian scenario, the prevalence of HTN is increasing at an alarming rate.<sup>7,8</sup> Through a cross-sectional, population

based study, the overall Indian prevalence of HTN was found to be 25.3%.<sup>9</sup>

The main aim of anti-hypertensive therapy was to reduce morbidity and mortality associated with HTN.<sup>10</sup> Clinically it has been evident that, the use of anti-hypertensive therapy significantly reduces the risk of various HTN associated complications.<sup>11</sup> Several classes of drugs such as diuretics, beta-blockers (BBs), angiotensin-converting enzyme inhibitors (ACEIs), angiotensin receptor blockers (ARBs), and calcium channel blockers (CCBs) are prescribed alone or in combination for the treatment of HTN.<sup>10,12</sup> For management of HTN, various guidelines are available such as American Society of Hypertension/ International Society of hypertension (ASH/ISH), Joint National Committee (JNC), (ESH)/European Society of Cardiology (ESC), National Institute for Health and Care Excellence (NICE) and Japanese Society of Hypertension guidelines.<sup>13</sup> Among these, JNC VIII guidelines (published in 2014) are considered as the “gold standard”.<sup>11</sup>

Choice of an appropriate anti-hypertensive drug depends on various factors like age of patient, underlying comorbid conditions, efficacy and safety of drug and cost of drug.<sup>11,12</sup> In 1977, drug utilization research was defined by WHO as “the marketing, distribution, prescription and use of drugs in a society, with special emphasis on the resulting medical, social, and economic consequences”.<sup>14</sup> Drug utilization research is an essential tool to facilitate the rational use of drugs and provides an insight into the pattern of drug use.<sup>14</sup> As such, it is necessary to emphasize appropriate methods for auditing drug therapy towards rationality.<sup>15</sup> Keeping this in mind, this study was planned to evaluate the current trends in prescription of antihypertensive drugs in a tertiary care hospital.

## METHODS

This prospective and observational study was carried out in department of pharmacology in collaboration with department of medicine of a tertiary healthcare teaching institute in Maharashtra after obtaining approval from the institutional ethics committee. Patients were given prior information.

### Study design

It was a hospital based prospective, cross-sectional and observational study.

### Study period

The study was conducted over a period of 3 months from 1<sup>st</sup> October 2018 to 31<sup>st</sup> December 2018 at a tertiary care teaching institute in Maharashtra.

### Sampling

A total of 390 prescriptions were selected.

### Inclusion criteria

All patients of either sex and above the age of 18 years visiting HTN OPD during the above-mentioned study duration were enrolled in the study.

### Exclusion criteria

Patients below the age of 18 years, those unwilling to participate in the study and all IPD patients.

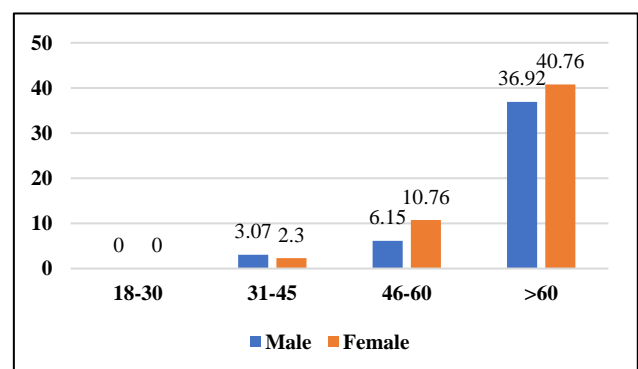
### Methodology

The following data was collected and analysed i.e. demographic information: age and sex; diagnosis; antihypertensive drugs categorized into different classes, their doses, frequency and dosage form; prevalence of polypharmacy.

Data was entered and analysed using Microsoft Excel 2013.

## RESULTS

During the study period, a total of 390 prescriptions of hypertensive patients were collected. It was observed that in our study, there was female predominance (53.84%) where as 46.15% prescriptions were of males. Figure 1 shows the age and gender wise distribution of HTN in patients. Maximum study participants were >60 years of age in which 144 (36.92%) were males and 159 (40.76%) were females. In the age group of 46-60 years, 24 (6.15%) were males and 42 (10.76%) were females. Also, 12 (3.07%) male cases and 9 (2.3%) female cases were observed in the age group of 31-45 years. However, no case of HTN was reported in the age group of 18-30 years. Type II diabetes was the only comorbidity observed in 72 (18.46%) patients.



**Figure 1: Age and gender wise distribution of patients.**

A total of 1632 drugs were prescribed for 390 patients of which 744 (45.58%) were antihypertensives and remaining 888 (54.41%) were multivitamins, oral hypoglycaemics and other concomitant drugs. All the drugs were prescribed by generic names. Average number of drugs prescribed per prescription was 4.18.

**Table 1: Prescribed anti-hypertensive drugs (monotherapy and combinations).**

Class of antihypertensive drug	Generic name of drug	No. of patients	Percentage (%)
<b>Monotherapy</b>		126	32.3
BB	Atenolol	6	1.53
CCB	Amlodipine	75	19.23
ACEI	Enalapril	45	11.53
<b>Two drug regimen</b>		183	46.92
CCB+ACEI	Amlodipine+enalapril	111	28.46
BB+CCB	Atenolol+amlodipine	24	6.15
ACEI+diuretic	Enalapril+furosemide	15	3.84
CCB+diuretic	Amlodipine+furosemide	9	2.3
BB+ACEI	Atenolol+enalapril	24	6.15
<b>Three drug regimen</b>		75	19.23
BB+CCB+diuretic	Atenolol+amlodipine+furosemide	3	0.76
ACEI+BB+CCB	Enalapril+atenolol+amlodipine	54	13.84
BB+ACEI+diuretic	Atenolol+enalapril+furosemide	9	2.3
ACEI+CCB+diuretic	Enalapril+amlodipine+furosemide	9	2.3
<b>Four drug regimen</b>		6	1.53
ACEI+BB+CCB+diuretic	Enalapril+amlodipine+furosemide	3	0.76
ACEI+BB+diuretic+diuretic	Enalapril+atenolol+furosemide+spironolactone	3	0.76
<b>Total</b>		390	100

BB: Beta Blocker, CCB: Calcium Channel Blocker, ACEI: Angiotensin converting enzyme inhibitors

Only 32.3% patients received single antihypertensive drug whereas most of the hypertensive patients were on multiple drug therapy (67.69%). The results revealed that prevalence of two drug regimen was the highest (46.92%) followed by monotherapy (32.3%). Three drug regimens were prescribed in 19.23% patients whereas only 1.53% patients received four drug regimens as shown in Table 1.

Among the monotherapy, the most frequently prescribed class was CCBs (amlodipine) for 75 patients (19.23%) followed by ACEIs (enalapril) for 45 patients (11.53%). Only 6 patients (1.53%) received BBs (atenolol) (Table 1).

In our study, five different two drug combinations of anti-hypertensive drugs were prescribed among which the combination of CCB with ACEI (amlodipine + enalapril) was prescribed the most (28.46%). The utilization of other two drug combinations was comparatively less (Table 1).

In three drug combinations, prescription of combination of ACEI, beta blocker and CCB (enalapril, atenolol and amlodipine combination) was the highest (13.84%). However, only 6 patients (1.43%) received combination of four anti-hypertensive drugs (Table 1).

## DISCUSSION

Monitoring of prescription pattern is an essential tool to promote rational use of drugs and minimise their abuse or misuse. It creates awareness among prescribers as well as

general public about appropriate usage of drugs, their quality, prescription trends and ensures compliance with standard treatment guidelines.<sup>15,16</sup>

In our present study, total 390 prescriptions in hypertension OPD were evaluated. It was observed that maximum number of patients were above 60 years of age. It is a well-established fact that BP increases steadily with age, which accounts for increased prevalence of HTN among older individuals.<sup>17,18</sup> This can be attributed to age related stiffening of blood vessels, reduction of baroreflex sensitivity, change in balance between  $\beta$ -adrenergic vasodilatation and  $\alpha$ -adrenergic vasoconstriction, and limited renal ability to excrete sodium overload.<sup>18,19</sup>

The present study observed that majority of the study population was female (53.84%). Similar trend was reported in studies by Abegaz et al and Gupta et al.<sup>20,21</sup> However, the above pattern is anomalous to other studies conducted by Jhaj et al and Murty et al that reported higher prevalence of HTN in males.<sup>22,23</sup> Out of 390 patients, comorbidity (type II diabetes mellitus) was observed only in 72 (18.46%) patients. Similarly, diabetes mellitus was reported as the most frequent co-morbidity in a study by Sakthi et al.<sup>24</sup>

The results of our present study showed that average number of drugs prescribed per prescription was 4.18 and all the drugs were prescribed by generic names. Similar trend was observed in a study conducted in rural areas of Kerala by Ramadas et al that reported 4.19 as average

number of drugs per prescription.<sup>25</sup> Maximum number of patients received multiple drug therapy (67.69%) which are comparable to findings in studies by Abegaz et al and Gupta et al that showed adequate management of HTN by utilising combination therapy.<sup>20,26</sup> It was observed that CCBs (19.23%) was the most commonly prescribed antihypertensive agent as monotherapy. Amlodipine was the only drug prescribed from this class in this study. Use of CCBs as monotherapy is in accordance with previous studies conducted by Konwar et al and Mishra et al.<sup>27,28</sup> Diuretics were not used as monotherapy and were preferred only in combination therapy. Adverse effect profile of diuretics on glucose homeostasis and lipid profile might be responsible for underutilisation of diuretics.<sup>29</sup> According to JNC VIII guidelines, BBs should not be used as first line therapy.<sup>11</sup> In spite of this, 1.53% patients in our study received atenolol as monotherapy.

In our present study, it was also observed that in combination therapy, two drug combination was preferred accounting for 46.92% prescriptions. Our findings are consistent with a study conducted by Gupta et al that observed more prevalence of dual antihypertensive therapy (41.9%).<sup>26</sup> Among the two drug combinations, the most prescribed combination was of CCB with ACEI (amlodipine+enalapril) (28.46%). JNCVIII guidelines advocate the use of ACEIs, ARBs, thiazide diuretics, and CCBs as monotherapy or in combination for the management of early stage HTN.<sup>11</sup> Hence, results of our study support adherence to JNCVIII guidelines.

It was observed that 19.23% patients were prescribed three drug combinations in our present study. Among them, prescription of ACEI+BB+CCB was the highest (13.84%) as seen in a study by Sikider et al.<sup>30</sup> However, several studies in the past reported the combination of ARB/ACEI, CCB and diuretics as the most preferred three drug combination.<sup>31-33</sup>

## CONCLUSION

This study provides an overview on utilization of antihypertensives in one of the tertiary care hospitals in Maharashtra. In this study, the overall analysis of prescription pattern suggests rationality in prescription practices in selection of suitable antihypertensive drugs and adherence to JNC VIII guidelines. Moreover, all the drugs were prescribed by generic names which advocates awareness among prescribers regarding WHO policies for generic prescribing. However, shorter duration and small sample size are some of the limitations of our present study. As such, more systematic studies are required in a developing country like India to evaluate drug utilization pattern of antihypertensive drugs that can cater individual needs of patients.

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