Original Research Article

Drug utilization study of anti-hypertensive drugs at a tertiary care hospital

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ABSTRACT

Background: The increasing prevalence of hypertension influence the prescribing patterns of antihypertensive drug. Prescribing against evidence-based guidelines in hypertension treatment leads to the increase cost of medications and problems in providing affordable prescriptions to population. The aim of present study was to analyse anti-hypertensive prescribing pattern in Government Medical College and Hospital, Aurangabad, Maharashtra, India.

Methods: Study was prospective, observational, open label and descriptive clinical study. It included 336 patients admitted in MICU during January 2018 to June 2019 fulfilling inclusion criteria.

Results: 54.46% patients were between 51-70 years of age, followed by 33.63% in 31 to 50 age group. Of total enrolled hypertensive patients 69% patients had various comorbidities. Drug prescribed was 28.27% ARBs, 26.84% CCBs, 17.62% beta blockers, 6.14% high ceiling diuretics, 4.50% ACE inhibitors, 2.45% thiazide diuretics and 2.04% received alpha blocker. As monotherapy, 31.82% patients received telmisartan as most commonly prescribed drug followed by 27.31% patients received Amlodipine followed by other drugs. In combination therapy telmisartan and hydrochlorothiazide was prescribed most commonly followed by beta blocker and CCB and ARB and CCB. 33.60% of drugs were prescribed in generic names while 66.39% of drugs prescribed in brand names. Average number of drugs prescribed per prescription was 1.45 of which 33.60% of drugs were prescribed by generic names.

Conclusions: With average number of drugs per prescription in hypertension 1.45, the study showed that poly pharmacy is unavoidable in hypertension due to associated comorbid conditions.

Keywords: Drug utilization, Anti-hypertensive, Tertiary care hospital

INTRODUCTION

Drug utilization studies are important for making amendments in the drug dispensing policies and to facilitate rational drug use. It helps especially in developing countries like India to utilize health resources efficiently.[1]

The joint national committee (JNC) guidelines and prescribing practices remains diverted as regards to JNC recommendations.[2] Different prescribing trends worldwide is a major problem of the health-care management system.[3]

Drug utilization studies are very important to see use and the role of drugs in society.[4] Socio-medical and health economic basis forms the basis for health-care decision-making.[5] DUS studies remains one of the most effective methods to assess the prescribing trends.[6]

Increasing prevalence of hypertension and cost of medications has always been a barrier in effective therapy. Rising expense of treatment has impact on prescribing patterns and also with compliance by the patients.[7] Rational antihypertensive therapy remains important as the prevalence of hypertension has raised in last three decades.[8]

Deviation of hypertension treatment from evidence-based guidelines contributes to the high cost not affordable prescription.[9] Drug utilization studies thus appropriately evaluate and analyze the medical, social and economic outcomes of the drug treatment. Also, it evaluates the prescribing attitude of physicians with the aim to provide drugs rationally.[10,11]

The aim of present study was to analyze anti-hypertensive prescribing pattern in a tertiary care Government Medical College Hospital, Aurangabad, Maharashtra, India.

Aims and objectives

To study drug utilization pattern in patients with hypertension in tertiary care hospital. To analyze the prescriptions for drug name, dose, duration, Mono therapy or combination therapy.

METHODS

This was a cross sectional, prospective observational study carried out in Department of Medicine, Government Medical College Aurangabad, (Maharashtra) on hypertensive patients with or without co-morbidity. 336 patients attending medicine department OPD and IPD diagnosed as hypertensive during January 2018 to June 2019 were studied.

Inclusion criteria

Inclusion criteria were patients with hypertension in stage-I/stage-II, newly diagnosed and old patients of hypertension and hypertensive patients with or without comorbidities. Patients with age 18 years and above. Patients who are willing to participate in the study.

Exclusion criteria

Exclusion criteria were pregnant patients with hypertension. Patients with systolic BP >210 and/or diastolic BP >120 mmHg, requiring emergency care. Not willing to give informed consent.

Procedure

Patients who came to medicine OPD/IPD for consultation and fulfilled the eligibility criteria and giving a written informed consent were enrolled in the study. The data was noted from the case record forms available in

Department of Medicine, Government Medical College, Aurangabad. The parameters studied were as below.[7,9,12]

Demographic characteristics of patients

Age distribution, gender distribution, age wise gender distribution, hypertension and comorbid conditions.

Drug utilization pattern

Average of route of administration of drugs, average number of drugs prescribed in the study population, number of individual class of drugs prescribed in the study population, analysis of combination anti-hypertensive classes, analysis of individual anti-hypertensive class/drug, analysis of drugs used as monotherapy and combination therapy, and percentage of drugs prescribed by generic name.

Prescription analysis using WHO drug use indicators

The average number of drugs per encounter, percentage of drugs prescribed by generic name, percentage of encounters with an antibiotic prescribed, percentage of encounters with an injection prescribed, and percentage of drugs prescribed from essential drugs list.

Statistical analysis

The data was analyzed using descriptive statistics in SPSS software version 21. The Demographic and continuous variables data was expressed as mean±SD (standard deviation). The categorical data was expressed as a percentage.

Ethical approval

The study was approved by the Institutional Ethics Committee of Government Medical College, Aurangabad, Maharashtra, India.

RESULTS

A total of 336 patients aged 18 years and above who had visited medicine OPD/IPD for the treatment of hypertension were studied from January 2018 to June 2019.

The participants of the study were in the range of age group from 18 to 85 years, the average age being 54.82 years with standard deviation of 12.60 years. Average age of male patients 54.71 years while female patients 54.68 years. Majority of patients 183 (54.46%) were belongs to 51-70 years group followed by 31 to 50 age group 113 (33.63%).

Out of 336 patients 153 were males and 183 were females found in the study population suggesting that female patients predominate the hypertension.

Table 1: **Age distribution.**

Age (in years)	No. of patients	Percentage
18-30	10	2.97
31-50	113	33.63
51-70	183	54.46
>70	30	8.92
Total	336	100
Range	25-85	
Mean	54.82±12.60	

Table 2: Gender distribution.

Gender	No. of patients	Percentage
Male	153	45.54
Female	183	54.46
Total	336	100

The relative distribution of age wise gender categories was, in age group from 31 to 50, out of 113 patients 47 (13.98%) were males and 66 (19.64%) were females. In age group from 51 to 70, out of 183 patients 82 (24.40%) were males and 101 (30.05%) were females. In each age group, females predominated except in above 70 years group.

Table 3: Age wise gender distribution.

Age (in years)	No. of patient	Gender			
		Male	%	Female	%
18-30	10	6	1.78	4	1.19
31-50	113	47	13.98	66	19.64
51-70	183	82	24.40	101	30.05
>70	30	18	5.35	12	3.57
Total	336	153	45.54	183	54.46

A total of 336 patients were enrolled in the study, out of which 69% had HTN with comorbidities.

Table 4: Distribution of hypertensive patients without and with comorbidities (n=336).

Distribution of total patients	No. of patients (%)
Hypertension without Comorbidities	104 (31)
Hypertension with Comorbidities	232 (69)

Of total enrolled hypertensive patients (n=336), 232 (69%) patients had various comorbidities. Diabetes mellitus was the most prevalent co-morbidity 35.77%, followed by cardiovascular and ischemic heart disease 25.86% and CKD and nephropathy 13.79%. Other least prevalent co-morbidities include cerebrovascular accidents 9.91% asthma and COPD 4.31%, thyroid disorders 5.17%.

Table 5: Distribution of co-morbidities in hypertensive patients (n=332).

Common co-morbidities	No. of patients (%)
Arthritis	3 (1.29)
Asthma and COPD	10 (4.31)
CKD and nephropathy	32 (13.79)
Cerebrovascular accidents	23 (9.91)
Cardiovascular and ischemic heart disease	60 (25.86)
Diabetes mellitus	83 (35.77)
Hyperlipidemia	5 (2.15)
Seizure disorder	4 (1.72)
Thyroid disorder	12 (5.17)
Total	232

A total of 488 drugs were prescribed in our study population. Out of these 483 drugs were anti-hypertensive 27 were from other classes. Out of total 488 drugs, 28.27% were ARBs, 26.84% were CCBs, 17.62% beta blockers, 30 (6.14%) high ceiling diuretics class, ACE inhibitors were 22 (4.50%), 12 (2.45%) were thiazide diuretics and 10 (2.04%) were alpha blocker drugs prescribed. While for other 73 conditions 7 statins, 6 antiplatelet and 6 anti-microbial agents, 5 NSAIDS and 3 were gastro protective agents (PPI) prescribed.

Table 6: Individual class of drug prescribed (n=488).

Individual class of drugs	Number (%)
ACEI	22 (4.50)
Alpha blocker	10 (2.04)
ARB	138 (28.27)
Beta blocker	86 (17.62)
CCB	131 (26.84)
High ceiling diuretic	30 (6.14)
Thiazide diuretic	12 (2.45)
Statin	7 (1.48)
NSAIDS	5 (1.05)
Anti-Platelet	6 (1.22)
PPI	3 (0.61)
Anti-bacterial	6 (1.22)

Among 421 single drug anti-hypertensive, 134 (31.82%) patients received Telmisartan as most commonly prescribed drug while 115 (27.31%) patients received amlodipine as second most commonly prescribed drug. Metoprolol (45), furosemide (32), atenolol (23), ramipril (21) and hydrochlorothiazide (12) were less commonly prescribed antihypertensive. While prazosin (9), carvedilol (8) labetalol (7), lisinopril (6), and losartan (7), torsemide (2) were least commonly prescribed drugs among study population.

Among antihypertensive combination drug therapy tablet telmisartan and hydrochlorothiazide was prescribed most

commonly in 11 patients while tablet spironolactone and furosemide were prescribed in 7 patients. While beta blocker and CCB and ARB and CCB were prescribed in 4 patients being 3rd in most commonly prescribed FDCs.

Table 7: Most commonly prescribed anti-hypertensive drug (n=421).

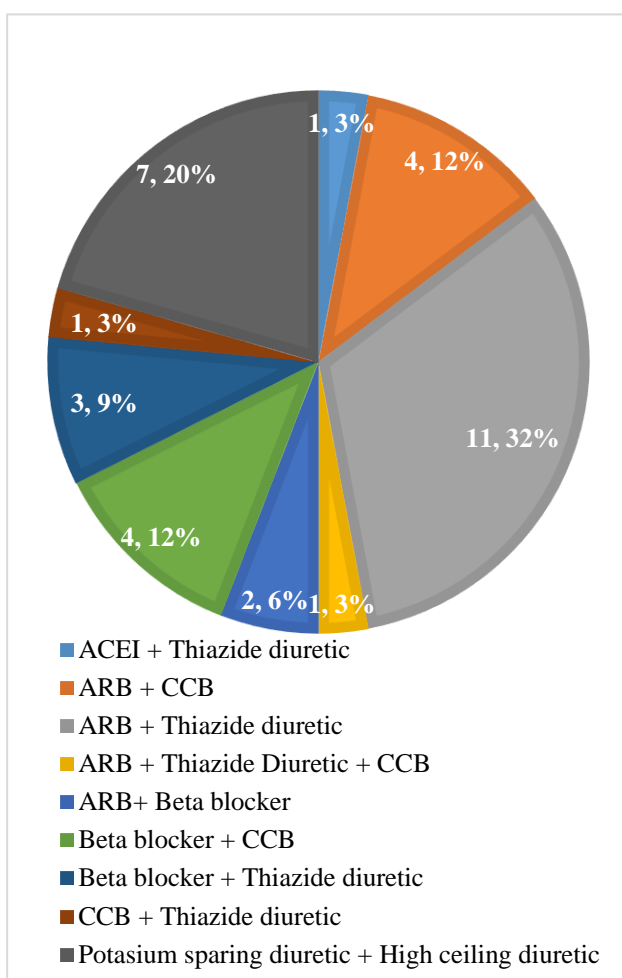| Drug class	Drug name	Number (%)
ARB	Telmisartan	134 (31.82)
CCB	Amlodipine	115 (27.31)
Beta blocker	Metoprolol	45 (10.68)
High ceiling diuretic	Furosemide	32 (7.60)
Beta blocker	Atenolol	23 (5.46)
ACEI	Ramipril	21 (4.98)

Figure 1: Combination of anti-hypertensive drugs (n=42) analysis of combination anti-hypertensive classes.

Percentage of monotherapy and combination therapy (n=488) analysis of antihypertensive drugs used as mono therapy and combination therapy

442 single drugs were prescribed while 46 combinations were found to be prescribed out of total 488 drugs.

Percentage of anti-hypertensive prescribed as monotherapy and combination therapy (n=463)

There were 421 antihypertensive which prescribed as a mono therapy while 42 drugs which were combination therapy. Among combination therapy ARB and thiazide diuretics were 11 drugs, alpha blocker and beta blocker was 8, and potassium sparing diuretics and high ceiling diuretics were 7 drugs.

Percentage of generic or brand drug

Out of 488 drugs 164 (33.60%) of drugs were prescribed in generic names while 324 (66.39%) of drugs prescribed in brand names.

Percentage of oral and IV drugs (n=488)

96 % of total drugs 488 were given orally while 4% of prescribed drugs of intravenous.

Average number of drugs prescribed

The average number of drugs prescribed per prescription in our study population was 2 with a standard deviation of 0.64 (2±0.64).

Number of individual class of drugs prescribed

A total of 488 drugs were prescribed in our study population. Out of these 483 drugs were anti-hypertensive 25 were from other classes.

Prescribing indicators evaluated as per WHO

Average no. of drugs per encounter (C)

C=B/A where B is total number of different drug products prescribed A is the number of encounters surveyed C=488/336=1.45.

Percentage of drugs prescribed by generic name (E)

E=D/Bx100 where D is the number of drugs prescribed by generic name B is the total number of drugs prescribed E=164*100/488=33.60%.

Percentage of encounters with antibiotic/s prescribed (G)

G=F/A×100 where F is the number of patient encounters with one or more antibiotic/s prescribed A is the total number of encounters surveyed G=6×100/336=1.78%.

Percentage of encounters with an injection prescribed (K)

K=J/A×100, where J is the total number of patients who received 1 or more injections (H) A is total number of encounters K=19×100/336=5.56%.

Percentage of drugs prescribed from essential drug list (M)

M=L/B×100, where L is the number of products prescribed from national list of essential medicines B is the total number of drugs prescribed M=126×100/488=25.81%.

As per World Health Organization (WHO) prescription indicators average number of drugs prescribed per prescription are 1.45 of which 33.60% of drugs were prescribed by generic names.

Percentage of antibiotics per prescription prescribed were 1.78% while 5.56% drugs were injectable out of total drugs prescribed. Out of 488 drugs prescribed the 126 drugs 25.815 were from WHO essential medicine list.

DISCUSSION

The study was undertaken with an aim to analyze the prescription pattern of antihypertensive. In this study, prescriptions of a total of 336 patients aged 18 years and above were reviewed and analyzed.

Data analysis of gender distribution in present study showed that there was a female predominance in this study. In the present study we found 45.54% prescriptions were of males and 54.46% were of females. This may be assigned to difference between lifestyle, dietary habits and stress.

Analysis of mean age of studied cases showed that in our study it was 54.82±12.60 years which is in contrast with study carried out by Jangir et al.[12] Mean age of 61.74 years whereas in the study by Khurshid et al showed mean age of 48.5±14.5 years which is less than our study.[13]

In the present study, out of 336 patients satisfying the inclusion criteria, 31% patients of hypertension were without comorbidities and 69% hypertensive patients were with comorbidities. Thus, more than half of the study population was found to have various comorbid conditions like diabetes, ischemic heart disease etc. A total of 232 patients 69% suffered from the comorbid conditions such as diabetes mellitus, CKD, dyslipidemia, IHD, CVA, Seizure disorder, epilepsy, asthma and COPD, and thyroid disorders. In present study, among the various comorbidities, diabetes mellitus was the most prevalent comorbidity 35.77%, followed by CVS and IHD 25.86 %, CKD and nephropathy 13.79%, CVA 9.91%, thyroid disorders 5.17%, asthma and COPD 4.31%, hyperlipidemia 2.15%, seizure disorder 1.72%, and arthritis 1.29% were the least prevalent co-morbidity. Comparable findings were seen in the study conducted by Popuri et al where DM was seen in 61.85% patients and IHD in 12.37% patients and also in the study by Pai et al.[14,15] It was reported that DM 47.5% was most prevalent comorbidity followed by dyslipidemia 18%, CKD 7.5% and others. In the study done by Krunal et al.[16] also DM was highly prevalent 40.33% and epilepsy 3.5% was the least noted comorbidity.

About 25.81% of the prescribed drugs in the present study were from NLEM in hypertension without and with comorbidities respectively. Study by Jainaf et al it was only 34.9%, which is nearby our study. Whereas in the study by Krunal et al.[16,17] had shown that 74.4% prescribed drugs were from NLEM much more than present study. This may be because of unavailability of the drugs from NLEM due to limited resources.

In the present study, monotherapy was seen in 90.93% and combination therapy in 9.07% which was higher than the study by Bipin et al where 52% of the patients were under monotherapy and 48% received combination therapy.[18] Also, in the study by Tiwari et al 98, 57.8% received monotherapy and 42.2% were under combination therapy. Study conducted in India pointed to a common trend that the study patients were on combination therapies with at least 2 anti-hypertensive drugs. This pattern is recommended by guidelines which state that small doses of different classes of anti-hypertensive drugs are more beneficial than a high dose of single drug.[19]

In the present study, telmisartan was the most commonly prescribed 31.82% anti-hypertensive followed by amlodipine 27.31%, which is comparable with the results of study by panda et al in which amlodipine was 16.1% while telmisartan was second most prescribed drug 13.5% patients.[18] The anti-hypertensive per prescription in the present study were 2 and similar findings were seen in the study done by Cheng from china 1.45, by Krunal et al 1.86, and in the study by Gauri et al 1.71.[16,20,21]

Percentage of drugs prescribed by generics was 33.60% while 66.39% of drugs prescribed in brand names. This is in contrast to the other studies like Anju et al where it was only 16.67% and in study from Bahrain by Fattouh et al it was 14.3%.[22,24] Surprisingly it was much lower only 3% in the study by Gauri et al.[21] The reason in favor of brand prescribing in the above studies may be due to reputation of pharmaceutical company, availability and ease of remembering the brand name and impact of medical representatives of pharmaceutical companies.

5.56% of total encounters were injectable drugs prescribed among hypertensive. In the previous studies in Saudi Arabia by Mahalli et al it was 2% and the study in Bahrain by Fattouh et al it was 8.3%.[23,24] The low percentage of injection utilization in this study is mostly because we had taken only patients of hypertension or may be due to less patients were required injectable for any serious conditions or may if at all it was required the physicians might have preferred and managed on oral drug. It is clearly evident from present study that a smaller number of drugs are prescribed by generic names.

More use of generic prescribing would rationalize the use and reduce the cost of drugs.

CONCLUSION

Hypertension disorder is associated with high levels of utilization of drugs for their treatment. Thus, analysis of utilization of these drugs becomes very essential. We conclude that in the present study, the anti-hypertensive drugs prescribed at our tertiary care hospital was found rational.

ACKNOWLEDGEMENTS

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