

RESEARCH ARTICLE

Study on antihypertensive drug utilization in a tertiary care hospital

Harish Govind Naik¹, Harshitha C S²

¹Department of Pharmacology, Karwar Institute of Medical Sciences, Karwar, Karnataka, India, ²MBBS Student, Karwar Institute of Medical Sciences, Karwar, Karnataka, India

Correspondence to: Harish Govind Naik, E-mail: harishhnaik@gmail.com

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ABSTRACT

Background: Among many public health challenges in the world, hypertension has a very important role to play and even more so in India. In India, hypertension prevalence ranges between 12 and 17% in rural and 20 and 40% among urban adults. For cardiovascular disease and stroke, hypertension is an important risk factor and it alone is responsible for about 50% of cardiovascular disease worldwide. Effective hypertensive treatment yields substantial benefit on these conditions. In achieving this, rational drug prescribing and drug utilization (DU) studies are vital. DU studies and prescription monitoring help in identifying associated problem, yield valuable feedback to the clinician, and thus help in bringing an awareness of the irrational prescribing and thus encouraging rational prescription. **Aim and Objective:** This study was fabricated to see the DU pattern of antihypertensive drugs in our teaching hospital. **Materials and Methods:** Case records diagnosed with hypertension were collected; the demographic information and prescription pattern were evaluated. The data collected were analyzed using Microsoft Excel software. **Results:** Of 93 cases studied, 47 patients were male and 46 were female. The age of the patients in the study ranged from 32 to 87 years. In the study, calcium channel blockers (CCBs) and diuretics were the frontline antihypertensive agents. If the overall DU frequency was considered, then CCBs were the preferred drugs with 87.09% utilization followed by diuretics with 64.71%. The WHO indicators (defined daily doses [DDD], DDD/1000 inhabitant/day) were used. **Conclusion:** The DDD/1000 inhabitant/day of amlodipine was the highest (17.5). Mostly, generic medicines were prescribed, which are welcoming and frequent use of generic drugs has to be encouraged.


KEY WORDS: Hypertension; Drug Utilization Study; Defined Daily Dose; Calcium Channel Blockers

INTRODUCTION

Globally, hypertension still remains major public health challenge and even more so in India. In India, hypertension prevalence ranges between 12 and 17% in rural and 20 and 40% among urban adults.^[1] For cardiovascular disease and stroke, hypertension is an important risk factor and it alone is responsible for about 50% of cardiovascular disease

worldwide. Effective hypertensive treatment yields substantial benefit on these conditions.^[1-3] Cognitive impairment in the aging population is also associated with hypertension. On confirmation of the diagnosis of hypertension, adequate control of blood pressure is necessary and it can be achieved by prescribing effective antihypertensive drugs and with regular monitoring of blood pressure, regular follow-up to decrease the morbidity and mortality and to improve the quality of life.^[4]

There are many risk factors for cardiovascular and cerebrovascular diseases, hypertension can be considered as the paramount risk factor, and over 1 billion individuals worldwide are affected by it. Hypertension can be held responsible for nearly 7.1 million deaths per year.^[5,6] With

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increasing age, the prevalence of hypertension also raises.^[5] The left ventricle hypertrophy, pathological alterations in the vascular system are associated with raised arterial pressure. As a result, one can consider hypertension as the primary cause of stroke; an important risk factor for coronary artery disease, myocardial infarction, and sudden cardiac death. It is also a major contributor to heart failure, dissecting aneurysm of the aorta, and renal insufficiency.

For brain infarction and hemorrhage, hypertension is a predominant risk factor. Majority of the strokes nearly 85% are due to infarction and the remainders are due to hemorrhage, either intracerebral hemorrhage or subarachnoid hemorrhage. Elevated systolic blood pressure levels, especially in individual above 65 years, are associated with the progressively increased incidences of stroke.^[7]

Drug utilization (DU) has been defined as the marketing, distribution, prescription, and use of the drugs in a society with special emphasis on the resulting medical and social consequences.^[8] In developing countries, rational drug prescription is essential as funds available and/or allocated by these countries for health care will be limited. Hence, in developing countries, rational drug prescription becomes very important so that the allocated funds can be utilized optimally.^[9]

DU studies provide valuable information about the unnecessary, irrational prescribing which is likely to make the therapy costly and also results in loss of working days which may result from hospitalization or morbidity. In country like India, increase in health-care cost due to irrational prescription is not affordable.^[9] Medical, economic, and also social consequences of drug therapy can be evaluated and analyzed by the DU studies. Hence, DU studies are more meaningful as they observe the drug prescribing attitude of the clinician with the aim of using the medicines rationally.

Recently for the assessment of the health systems, the DU studies have become potential tool. Wide geographical differences with respect to prescription of some groups of medicines have been revealed by the DU studies. DU studies focus on wide variety of factors related to prescribing, dispensing, administration of drugs, and its associated events.^[9] Investigation of the drug efficacy can be done at different levels in the community. It is important to study the value of the medicines prescribed and their expected potential in particular community.^[10,11]

DU studies of antihypertensive agents were conducted across the world.^[12-16] Abundance of new drugs is now available and the quality of life of the patients has improved substantially. For effective long-term management of hypertension, variety of drugs is used in combinations.^[15] Several clinical trials have documented reduction in the strokes morbidity and mortality with effective use of antihypertensive medicines.^[17] Hence,

on confirming the diagnosis of hypertension, it is necessary that the blood pressure should be controlled optimally by prescribing effective antihypertensive drugs and with regular monitoring of blood pressure, regular follow-up.^[4]

It is very important to compare the DU among different community, health institution within the nation, and also different countries, but to imply these utilizations have to be in internationally accepted units. Drug consumption can be expressed in different way. Number of prescriptions, number of units dispensed or sold, and costs are few of the drug consumption parameter used before the implementation of an international accepted unit. Even though the above-mentioned parameters were helpful, they had their own limitation when comparing drug consumption at international level.^[18] Defined daily dose (DDD) is an internationally accepted and used unit of drug consumption which is agreed on to overcome the limitations noted with units prescribed or sold, cost. The utilization studies on hypertensive patients are plenty, but studies involving patients from Karwar are very less. Hence, the objective of the study is to concentrate on the antihypertensive DU trends in hypertensive patients in Karwar Institute of Medical Sciences, Karwar.

MATERIALS AND METHODS

As the first step, the study proposal was presented to the Institutional Ethical Committee of Karwar Institute of Medical Sciences, Karwar. The present study was started once the permission was granted by the Ethical Committee. The present study included patients who were diagnosed of hypertension and admitted to the hospital. It was a 6 months (July 2017–December 2017) cross-sectional, non-interventional, retrospective, and observational study. The information's were collected from the medical record room. For this necessary, permission was obtained from the concerned authorities of Karwar Government Hospital. The retrospective analysis of case records of the hypertensive patients admitted to the Karwar Government Hospital during the period from July 1, 2017, to December 31, 2017, was carried out. Diagnosis along with the drugs prescribed was recorded for each patient. Furthermore, the demographic status of the patient was noted.

Data Analysis

The data collected were condensed and master charts were prepared for data analysis. The overall information generated was thoroughly analyzed to study:

- The DU in terms of percentage of prescribing prevalence
- The DU in terms of DDD/1000 inhabitants/day
- Presence of associated illnesses
- The outcome of each patient
- Average duration of stay in the hospital
- To compare between prescribed daily dose (PDD) and DDD
- To find out the percentage of use of combination therapy.

For the DU, quantification anatomical therapeutic chemical (ATC) classification and DDD system were used. The results obtained were expressed in terms of DDD per 1000 inhabitants per day (DDD/1000 inhabitants/day).^[10,11]

Formula:

$$DDD / 1000 \text{ inhabitants} / \text{day} = \frac{\text{Total use of a drug (mg) during the study period}}{\text{DDD (mg)} \times \text{Duration of study} \times \text{Total sample size}} \times 1000$$

RESULTS

DU pattern in the hypertensive patients at Karwar Institute of Medical Sciences, Karwar, was monitored in our study. Of 93 cases studied, 47 patients were male and 46 were female. The age of the patients in the study ranged from 32 to 87 years. The findings of the study are depicted in Tables 1-9.

Table 1: Age- and sex-wise distribution of illness

Age	Sex		Number	Percentage
	Male	Female		
30-39	1	2	3	3.22
40-49	9	4	13	13.97
50-59	6	8	14	15.05
60-69	18	12	30	32.25
70-79	8	16	24	25.80
80-89	5	4	9	9.67

Table 2: Blood pressure at the time of admission and discharge

Blood pressure	During admission	At the time of discharge
Systolic	169.34	128.91
Diastolic	99.23	91.08

Table 3: Associated illness

Illness	Number	Percentage
Diabetes mellitus	23	24.73
Ischemic heart disease	22	23.65
Chronic obstructive pulmonary disease	4	4.30
Alcoholic liver disease	3	3.22
Gastritis	3	3.22
Bronchitis	2	2.15
Urinary tract infection	2	2.15
Bronchiectasis	1	1.07
Pneumonia	1	1.07
Cellulitis	1	1.07
Chronic renal failure	1	1.07

Of 93 cases, isolated diagnosis of hypertension was 30, and in remaining cases, hypertension was associated with other illness.

DISCUSSION

Among many public health challenges in the world, hypertension has a very important role to play and even more

Table 4: State of the patients at the time of discharge

Improved	Discharged against advice	Expired
79	13	1

Table 5: Chief complaints*

Giddiness	Difficulty in breathing	Chest pain	Fever and generalized weakness
24	3	1	2

*Chief complaints in 30 isolated cases of hypertension

Table 6: Number and percentage of major class of antihypertensive drugs prescribed

Class of drugs	Number	Percentage
Calcium channel blockers	81	87.09
Diuretics	60	64.51
Angiotensin receptor blockers	10	10.75
Beta-blockers	9	9.67
Centrally-acting alpha-agonist	2	2.15
Alpha-blocker	1	1.07

Table 7: Distribution of cardiovascular drugs

Class of drugs	Number	Percentage
Antihypertensive drugs		
Amlodipine	81	87.09
Furosemide oral	30	32.25
Furosemide I.V.	26	27.95
Atenolol	9	9.67
Losartan	6	6.45
Clonidine	2	2.15
Azilsartan	2	2.15
Torsemide	2	2.15
Telmisartan	2	2.15
Prazosin	1	1.07
Chlorthalidone	1	1.07
Spironolactone	1	1.07
Antiplatelet drugs		
Aspirin	21	22.58
Clopidogrel	9	9.67
Hypolipidemic drugs		
Atorvastatin	15	16.12
Rosuvastatin	1	1.07

Table 8: DDD, PDD, and DDD/1000 inhabitants/day of the AMAs and other drugs

Drug	DDD (mg)	PDD	DDDs/1000 inhabitants/day
Antihypertensive drugs			
Amlodipine	5	6.71	17.50818139
Furosemide oral	40	54.8705	6.813931744
Furosemide I.V.	40	38.7878	3.740065451
Atenolol	75	56.94444	1.59731962
Losartan	50	39.47	0.87
Clonidine	0.45	0.28	0.18
Azilsartan	40	40	0.17
Torsemide	15	20	0.31
Telmisartan	40	47.5	0.55
Prazosin	5	10	0.11
Chlorthalidone	25	12.5	0.029
Spirolactone	75	25	0.03
Antiplatelet drugs			
Aspirin	150	133.06	3.21
Clopidogrel	75	112.5	2.805
Hypolipidemic drugs			
Atorvastatin	20	17.02	2.80
Rosuvastatin	10	20	0.23

DDD: Defined daily doses, PDD: Prescribed daily dose, ATC: Anatomical therapeutic chemical

Table 9: PDD and DDD comparison

PDD>DDD	PDD<DDD	PDD=DDD
Amlodipine	Furosemide I.V.	Azilsartan
Furosemide oral	Atenolol	
Torsemide	Losartan	
Telmisartan	Clonidine	
Prazosin	Chlorthalidone	
	Spirolactone	

DDD: Defined daily doses, PDD: Prescribed daily dose

so in India. In India, hypertension prevalence ranges between 12 and 17% in rural and 20 and 40% among urban adults.^[1] The study indicates the general trends of use of the medicines in the treatment of hypertension in Karwar Institute of Medical Sciences, Karwar.

DU studies evaluate and provide a valuable feedback to the health-care professional. DU studies help clinicians in finding ways to better their own performance and thus making the drug to be more effective in their respective use. DU studies should not be considered as threat and/or as a bureaucratic burden; rather, it should be recognized as tool to educate the health professionals and a method to increase our job satisfaction. "DU Research Group (DURG)" of the WHO is responsible for monitoring DU studies and to prescribe the guidelines regularly.

For cardiovascular disease and stroke, hypertension is an important risk factor and it alone is responsible for about 50% of cardiovascular disease worldwide. Effective hypertensive treatment yields substantial benefit on these conditions.^[1-3] Cognitive impairment in the aging population is also associated with hypertension. On confirmation of the diagnosis of hypertension, it is necessary that the blood pressure should be controlled adequately by prescribing effective antihypertensive drugs and with regular monitoring of blood pressure, regular follow-up to decrease the morbidity and mortality and to better the quality of life.^[4]

Of 93 cases studied, 47 patients were male and 46 were female. The age of the patients in the study ranged from 32 to 87 years. Majority of the patients were in the age group of 60–69 (32.25%) followed by 70–79 (25.8%). Female hypertensive was more in the age group of 70–79 followed by 60–69 age group. In a similar study conducted by Datta had 63% of male patients compared to our 50.53%.^[19]

Of 93 cases, isolated diagnosis of hypertension was 30, and in remaining cases, hypertension was associated with other illness. Giddiness (chief complaint of 24 patients) was the major complaint for admission of this patient to the hospital. Average blood pressure of the patient during admission was 169.34/99.23 mmHg and at the time of discharge was 128.91/91.08 mmHg which indicate the improvement in blood pressure at the time discharge, which is evident as 84.94% of patients stated as improved at the time of discharge.

As per the JNC 7 guidelines, the therapy should be started with a thiazide-type diuretic for most of the cases. Other drugs that may be considered are calcium channel blockers (CCBs), angiotensin-converting enzyme inhibitors (ACEI), angiotensin receptor blockers (ARBs), or β -blockers or a combination therapy. In Stage 2 hypertension, a combination therapy should be preferred. Usually, a combination of thiazide-type diuretic with ACEI or ARB or β -blocker or CCB should be preferred.^[20]

In the study, CCBs and diuretics were the frontline drugs for the treatment of hypertension. If the overall DU frequency was considered, then CCBs were the preferred drugs with 87.09% utilization followed by diuretics with 64.71%, ARBs with 10.75%, and β -blockers with 9.67 as shown in Table 6. Similar results were noted in studies conducted by Xavier *et al.* and Rachana *et al.*^[21,22]

The CCB – amlodipine, as an antihypertensive agent, outdistances the utilization of any other antihypertensive drug in our study. The factors that make it an ideal antihypertensive drug include long duration of action and once-daily dosing, thus improving the compliance of patients, sustained and controlled blood pressure controls. These desirable features of amlodipine may probably contribute to its predominant utilization. Similar trends have also been noted in the studies carried by Xavier *et al.* and Rachana *et al.*^[21,22]

As it is government hospital, generic medicines were prescribed and this is always a welcoming sign. Pharmacies can have much better inventory control if generic medicines are prescribed. By encouraging generic medicines, it is possible to reduce the number of brands in the pharmacy, and it will also decrease the confusion while dispensing among the pharmacists. Pharmaceutical companies' strong promotional approach might be responsible for prescribing non-generic medicines economically when compared to generic medicines are always better than the branded drugs but with similar efficacy.

Different illness, national therapy traditions, and severity of the illness can vary the values of PDD. The DDDs for most illness are established on the treatment of moderately severe diseases. When using DDD as unit, it should be noted that usually higher doses are used frequently in hospital care. In our study also, PDD and DDD varied for different drugs which were evident based on Table 9.

The highest value of 17.50 DDD/1000 inhabitants/day was accounted for amlodipine, indicating that it was the favored drug of choice as an antihypertensive agent.

CONCLUSION

In our study, for the treatment of hypertension CCBs were commonly prescribed medicines followed by diuretics. The most commonly used CCB was amlodipine. In majority of times, generic medicines were prescribed, which are welcoming and prescribing by generic names which have to be encouraged.

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