Research Article

A Prospective Study On Drug Utilization Review Of Prescriptions Among Hypertensive Subjects At A Tertiary Care Hospital In Dakshina Kannada

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ABSTRACT

Hypertension, is one of the diseases that has severe impact on body and economy. Main aim and objective of our study was to find out the prescribing patterns of drugs among hypertensive patients. **Materials and method:** A prospective observational study was conducted at a tertiary care hospital in Dakshina Kannada for period of 6 months. 150 hypertensive patients who were on at least one antihypertensive medication, admitted to in-patient department were included for drug utilization study. **Result**: According to the study, 54% of hypertensive subjects were above 60- 75 years of age. 86% of prescription had more than 6 drugs. 66% of prescription had at least one antibiotic among which cephalosporin (37.84%) was the most common one. 81.33% of the patients received at least one injection. 64% of the prescriptions were not prescribed in generic name. As per the study, the most frequently prescribed antihypertensive drug was calcium channel blocker (36.10%) - Amlodipine. **Conclusion**: In the present study, drug utilization parameters were carried out using WHO core drug indicators which showed overprescription of antibiotics and injections which is a leading cause for increase in economic burden and majority of prescriptions did not have drugs prescribed in generic name. Prescribing drugs using generic names, decreases medical confusion and allows selection of better alternatives.

INTRODUCTION

Globally, hypertension is responsible for 7.5 million fatalities. Nearly one-third of all deaths worldwide due to complications of hypertension, or 17 million deaths per year, are caused by cardiovascular disease. This accounts for 9.4 million deaths annually. [1]

According to the WHO, high blood pressure is a serious public health problem that accounts for one in eight fatalities.[2] Drug utilisation review (DUR)

is a systemic ongoing process of gathering explanatory and evaluating techniques for quantifying, comprehending, and analysing the processes of prescribing, dispensing, and consuming medications as well as for testing interventions to improve the speed and calibre of these processes.[3]

One of the approaches to aid rational drug use is the appraisal of drug prescribing patterns based on drug use indicators. In order to achieve the best outcome in the shortest amount of time at the most affordable price, rational drug prescribing involves using the fewest number of drugs possible.[4]

OBJECTIVES

To evaluate drug utilization of drugs among hypertensive patients at a tertiary care hospital in Dakshina Kannada

Specific objective:

To assess WHO Core drug use indicator, where average number and percentage of commonly used drugs will be analysed viz.,

● Drugs per prescription/patient

● Antibiotic per prescription/patient.

● Drugs prescribed in generic name

● Prescriptions with injection(s) prescribed

MATERIALS AND METHODS

Study design:A prospective observational study to evaluate drug utilisation among hypertensive patients.

Study site: The study was conducted at Srinivas Institute of Medical Science and Research Centre, Mukka-574146

Study duration: The study was conducted for aduration of 6 months from March 2022 – August 2022.

Sample size: The sample taken for the study was 150.

Ethical clearance: The study protocol was approved by the Institutional Ethics Committee (IEC) of Srinivas Institute of Medical Science, Mukka, Mangaluru.

Study criteria:

Inclusion criteria:
● Hypertensive patients
● Patients above 18 years of age
● Patient with comorbid conditions: Stroke, CKD, DM, Hyperlipidemia, CHF and others
● Patient on at least one oral antihypertensive drug

Exclusion criteria:
● Out-patients
● Patients below 18 years of age

Source of data:
Data(s) for the study were collected using data collection form from the in-patient case files.

Study method:
Data(s) were collected using data collection form with the aid of medical records of in-patients in a tertiary care hospital, Mangaluru.Data collected include patient name, gender, age, diagnosis and drugs prescribed.The obtained results after the application of suitable tools were analysed in Microsoft excel and all the data(s) were kept confidential.

Statistical analysis:
Statistical analysis involves collecting and scrutinizing of every data sample in a set of items from which samples were drawn and a suitable statistic method was applied to analyse the data. The collected data(s) were analysed using Microsoft excel.

RESULTS

Demographic detail:
A drug utilization study was conductedwith sample size of 150 and the subjects were all hypertensive patients above 18 years of age. Among the 150 subjects, 54% were of age group 61 to 75 years[N=81, Male-49, Female-32]. 30% of sample were from age group of 41 -60 years [N=45, Male-18, Female-27]. 12% of subjects were from age group above 75 years [N18, Male-8, Female-10]. 4% of sample were of age group 18-40 years and all were male [6], as per the Fig.1. This study was carried out by analysing the inpatient case files and confidentiality was

maintained. In this study 54% of the participants were male patients among them 14.81% were underweight and 40.7% were of normal weight, 32.09% overweight, 12.34% were obese and out of 46% of the female patients, 5.79% were found to have underweight, 33.33% had normal weight, 43.47% were overweight and remaining 17.39% were obese (Table 1).

Data showed that in male patients, 33.33% had stage 1 HTN, 23.45% had stage 2 hypertension and hypertensive crisis, 9.87% had elevated BP and the remaining had normal BP, and in female 34.78% had stage 1 hypertension, 27.53% had stage 2 hypertension, 14.49% had hypertensive crisis, 13.04% had elevated BP and the rest were normal. (Table 1).

Table 1: Demographic details and clinical characteristics of Hypertension

Characteristics	Male n=81		Female n= 69		TOTAL N=150	
AGE	n	%	n	%	n	%
18- 40 years	6	7.41%	0	0.00%	6	4.00%
41-60 years	20	24.69%	27	39.13%	47	31.33%
61-75 years	47	58.02%	33	47.83%	80	53.33%
Above 75 years	8	9.88%	9	13.04%	17	11.33%
BMI						
Under weight - <18.50kg/sq.m	12	14.81%	4	5.80%	16	10.67%
Normal weight - 18.50-24.99 kg/sq.m	33	40.74%	23	33.33%	56	37.33%
Over weight - 25.0- 29.99 kg/sq.m	26	32.10%	30	43.48%	56	37.33%
Obese - >/= 30 kg/sq.m	10	12.35%	12	17.39%	22	14.67%
BLOOD PRESSURE [mmHg]						
Normal <120/80	8	9.88%	7	10.14%	15	10.00%
Elevated 120-129/<80	8	9.88%	9	13.04%	17	11.33%
Stage 1 HTN 130-139/80-89	27	33.33%	24	34.78%	51	34.00%
Stage 2 HTN 140 or </90 or <	19	23.46%	19	27.54%	38	25.33%
Hypertensive Crisis 160</120<	19	23.46%	10	14.49%	29	19.33%

Co- morbidities and classes of drugs prescribed:

According to the data obtained,, it was found that 24.84% had Diabetes Mellitus, 12.75% had renal disease, 12.09% had other cardiovascular disease, 8.17% were having lung disorders. CNS disorders, thyroid disorders, dyslipidemia, liver disorders and anemia constituted 5.23%, 4.90%, 3.92%, 3.27%, 2.29% respectively. 22.55% had other comorbidities. (Table 2)

Table 2: Co morbidities

Co- morbidities	Percentage (%)
Diabetes Mellitus	24.84
Renal disease	12.75
Other CV disease	12.09
Lung disorders	8.17
CNS disorder	5.23
Thyroid disorder	4.90
Dyslipidemia	3.92
Liver diseases	3.27
Anaemia	2.29
Others	22.55

All the prescriptions had atleast one oral antihypertensive agents. While analysing the 150 prescriptions for identifying the classes of drugs prescribed other than antihypertensive, 15.42% of the drugs were gastroprotectant, 14.01% were antibiotics, 11.31% were analgesics, 9.25% antidiabetics, 6.56% multivitamins, 6.04% antiemetics, 5.66% antiplatelet, 5.27% lipid lowering agents, 4.76% electrolytes, followed by anxiolytics/ antidepressants, thyroid preparations, anticholinergics constituting 3.08%, 1.80%, 0.51% respectively, (Table 3)

Table 3: Class of drugs prescribed other than antihypertensive

Class of drugs prescribed other than antihypertensive	Percentage
Gastroprotectants	15.42
Antibiotics	14.01
Analgesics	11.31
Antidiabetics	9.25
Multivitamins	6.56
Antiemetics	6.04
Antiplatelet	5.66
Lipid lowering agents	5.27
Electrolytes	4.76
Antidepressants/ anxiolytics	3.08
Thyroid preparations	1.80
Anticholinergis	0.51
Others	16.32

Drug utilization evaluation using WHO core drug use indicators:

Drugs/prescription:

Among 150 prescriptions analyzed using WHO core drug use indicators, the mean number of drugs per prescription was computed to 9.77 ± 3.78 [Mean ± SD]. 47.33% of the prescription had 6-10 drugs, 38.67% of prescription had 11- 15 drugs, 6% had more than 15 drugs. Only 8% of the prescription had drugs ranging between 1 and 5. (Table4)

Table:4 Drug utilization review

WHO core drug use indicator		
Prescribing indicator	**WHO standard**	**Value**
Average number of drugs /prescription	1.6-1.8	9.7
Percentage of encounter with antibiotics	[20.0 -26.8] %	66%
Percentage of drugs prescribed by generic name	100%	34%
Percentage of encounter with injections	[13.4-24.1] %	81.3%
Mean ± SD		
Indicator	**Mean ± SD**	
Number of drugs/prescription	9.77 ± 3.78	
Antibiotics/ prescription	0.90 ± 0.78	
Drugs prescribed in generic name / prescription	0.58 ± 1.11	

Number of antibiotics per prescription:

When analyzing the number of antibiotics prescribed, 34%of the prescriptions were not prescribed with any antibiotics and the remaining 42% of the prescriptions were prescribed with 1 antibiotic and 22% had 2 antibiotics and the remaining 2% had 3 antibiotics.(Figure 1).
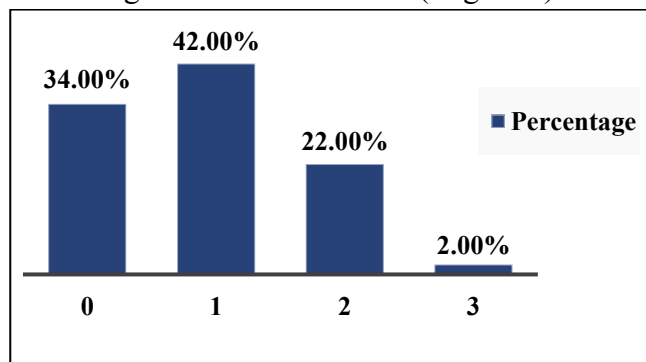

Figure 1: **Number of antibiotics /prescription**

Class of antibiotics prescribed:

Among the classes of antibiotics prescribed , 37.84% of the antibiotics were Cephalosporins, 14.59% were Penicillin antibiotics, Nitroimidazoles, Quinolones, Macrolides, Carbpenem, Aminoglycosides, Lincomycins, constituted 5.95%, 4.32%, 2.70%, 2.16%, 1.08%, 0.54% respectively.(Figure 2).
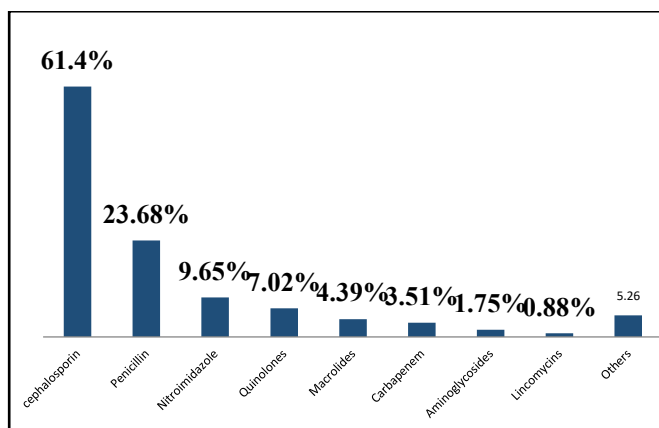
Figure 2: Classes of antibiotic prescribed

Number of drugs prescribed in generic name:

In the study, out of 150 prescriptions, 64% of prescription did not have any drugs prescribed in generic name, 26.67% of the prescriptions had 1 drug prescribed in generic name, 5.33% had 2 drugs prescribed in generic name and 2.67% had 3 drugs in generic name, and 0.67% had 4 and 5 or more generic drugs each.(Figure 3)
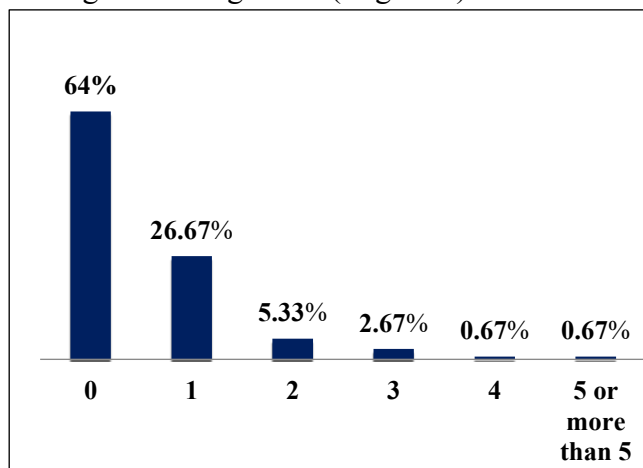

Figure 3: Number of drugs prescribed in generic name/prescription

Number of injections/prescription:

Out of 150 prescriptions, 18.67% of the prescription did not have any injections. 20.67% of prescriptions had 2 injections, 19.33% of prescriptions had 4 injections, 10% had 3 injections, 9.33% had 1 injection, similarly prescriptions having 5,7 injections constituted 6.67%, prescriptions with 6, 8, 10 or more constituted 6%, 2% and 0.67% respectively. (Figure 4).
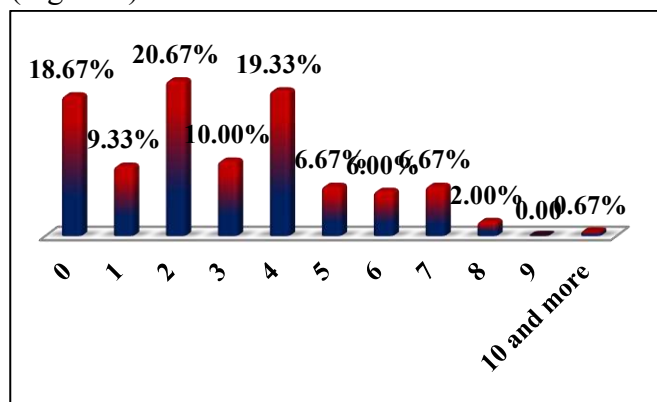

Figure 4: Number of injections per prescription

Drug utilization review of antihypertensive drugs

According to the study, out of 150 prescriptions, 36.10% of people were prescribed calcium channel blockers, 17.07% of people were prescribed ARB, 15.12% of the prescription had beta blockers, and 13.17% were given diuretics. Alpha blockers, centrally acting sympatholytics, vasodilators and ACE inhibitors contributed 8.78%, 5.85%, 1.95% and 1.95% respectively. This study shows that out of 150 prescriptions, 29 of them had antihypertensive combination drugs. 26 prescriptions had dual drug combination, and the remaining 3 prescriptions had triple drug combinations. Out of 29 prescriptions with combination antihypertensives, 41.38% (12) of them had ARB+CCB, 27.59%(8) had D+ARB, 17.24%(5) had CCB+BB, 3.45% (1) had ARB+BB and 10.34% (3) prescriptions had triple drug combination of ARB+CCB+D.

DISCUSSION

The prescription, dispensing, and consumption of medication have been shown to be effective in cases of therapy based on literature data. According to the study, 66% [N=99, M=57, F=42] of hypertensive subjects were of above 60 years of age, which was similar to the study conducted by Ramakrishnan S et al., where prevalence increased with age; especially in those with age ≥65 years.[5]In older people, HTN is specifically caused by

mechanical hemodynamic alterations, arterial stiffness, neurohormonal and autonomic dysregulation, and renal ageing.[6]

As stated in the study, the prevalence of hypertension was seen more in males (54%) compared to females (46%) which supports the results of a related study by Connelly PJ et al., in which it became apparent that men (34.6%) had higher rates of hypertension than women (30.8%). In reference to the study, prevalence of HTN in male was seen more compared to female, particularly with the age group below 40 years [male- 4%[N=6], female- 0%] where all were male, but during the fourth decade of age, the rate of developing HTN in female was high compared to male. Similar result was found in a study where males continue to have higher rates of this condition (18–39 years: 31.2 vs 13.0%; 40–59 years: 59.4 vs 49.9%; over 60 years: 75.2 vs 73.9%); however, the rate at which females develop hypertension is much steeper compared to males.[7]The likelihood of the subjects having hypertension increased with age.[8]

Observed gender differences in hypertension, which exist in human and animal populations, are due to both biological and behavioural factors.[9]The biological factors include sex hormones, chromosomal differences, and other biological sex differences that are protective against hypertension in women.[10]Nevertheless, with increasing age, the females' advantage of protection against hypertension is lost and the development of hypertension accelerates when compared to males.[11]

According to a study carried out by Moges B et al., the prevalence of overweight based on calculated body mass index (BMI) was 32.4% (22/68) while the prevalence of obesity was 16.2% (11/68).[11]Similarly, in conforming to the present study, 37.3% of sample were overweight and 14.67% were obese.

Even though the mechanisms of obesity-induced hypertension are still being meticulously scrutinized, research in experimental animals and humans recommend vital roles for impaired renal-pressure natriuresis due to physical compression of the kidneys and activation of the ReninAngiotensinAldosterone System and Sympathetic Nervous System. As obesity and its metabolic and hemodynamic consequences are sustained during many years, renal injury gradually makes the hypertension more severe and more resistance to therapy.[12]

A study by Shukrala F et al., reported that out of 400 samples, most of the patients had Stage 1 hypertension (69%), followed by Stage 2 hypertension (31%).[13] Similarly, in accord with this study, 34% had Stage 1 HTN, 25.33% had stage 2 HTN, 19.33% had Hypertensive Crisis, 11.33% had prehypertension and 10% of the subjects had their blood pressure under control.

Conforming to the present study, on analyzing WHO core drug use indicators, the mean number of drugs per prescription was computed to 9.77 ± 3.78 [Mean $\pm$ SD], 66% of prescription had at least one antibiotic among which cephalosporin antibiotic was most commonly prescribed accounting to 61.4%. 81.33% of the patients received at least one injection. Only 36% of the medicines were prescribed in generic names. Thus, the current pattern was similar to the study done by Shrestha B et al., where a total of 605 prescriptions were analyzed and the average number of drugs per prescription was 5.85 considering the total amount of prescriptions indicating polypharmacy. Furthermore, assuming each prescription as an individual patient, 64.1% of patients received antibiotics, and 71% of patients received injectable form of drugs. Most pervasively prescribed antibiotics were Ceftriaxone, Amoxicillin/Cloxacillin, Azithromycin, Cefixime, and Cloxacillin. Only 16.94% of the medicines were prescribed in generic names with the rest

83.06% of the medicines being prescribed in brand names. [14]

It was observed that the drugs prescribed increased with progression of disease along with different comorbid conditions.[15] Overprescribing than necessary leads to polypharmacy which in turn results in negative consequences like economic as well as disease burden to the patients and lack of adherence.[16,17,18] Increasing use of antibiotics not only leads to increased cost of therapy, but also leads to the development of drug resistant bacterial strains.[19,20,21] WHO considers antibiotic resistance to be a major threat to world health, food security It occurs due to misuse, overuse and overprescription of antibiotics.[22]

Prescribing drugs using generic names is a good practice as it decreases medical confusion, enhances clarity amongst healthcare professionals, assists hospital pharmacies to have an effective inventory control and allows selection of better drug alternatives.[23]

Injections are costly as compared to other dosage form and their use is associated with problems like local irritation, phlebitis, and extravasation. They also have a tendency to increase infections and lead to sepsis in a few cases.[24]comparison of obtained result with WHO standard is done.(Table4)

Among 150 prescriptions, gastroprotectants [15.42%] were the most often prescribed class of medication, followed by antibiotics [14.01%], analgesics [11.31%], and antidiabetics [9.25%]. According to the study by Sarwar MR et al., the most frequently prescribed drug classes were alimentary drugs (80[25]

Majority of the patients had comorbidities among which, 24.84% had Diabetes Mellitus, 12.75% of patients had renal disease, and 12.09% had other cardiovascular diseases. This correlates with the study by Datta S et al., where, most common comorbidities included diabetes (44.7%), ischemic heart disease (27.2%), and renal parenchymal disease (20.2%).[26?]

Diabetes and hypertension frequently co-occur and have related problems. Both macrovascular and microvascular diseases are among these consequences.[27] The ReninAngiotensinAldosterone System, the function of natriuretic peptides and the endothelium, the sympathetic nervous system, and the immune system are only a few of the complex interrelated components that contribute to maintaining physiological blood pressure levels. Disruption of components that regulate blood pressure can cause an increase in mean blood pressure, which over time can cause damage to target organs (such as left ventricular hypertrophy and CKD) and CVD outcomes.[28]

On the basis of data collected for prescribing patterns for antihypertensive drugs, 51.4% of prescription had more than 2 drugs, which is consistent with the research conducted by Joseph S. et al., who used Phadke's criterion to evaluate the appropriateness of prescribing. The majority of patients were found to be taking two or more medications, and CCBs were the most frequently prescribed antihypertensive drugs.[29]

According to the study, CCBs were the most frequently prescribed medications, which is consistent with the study by Anuradha VP et al., in which CCBs were the most frequently prescribed medication out of 1070 prescribed medications (26.26%), followed by ARBs (23.27%), Beta blockers, Diuretics, ACE inhibitors, Centrally acting sympatholytics, and vasodilators.[30]Amlodipine, a calcium channel blocker, was most frequently administered as monotherapy and in fixed dose combinations (51.81%), which is consistent with a study by Naik HG et al. that found Amlodipine (49%) to be the most commonly prescribed antihypertensive. [31] A fixed low dose combination will help increase tolerance and compliance, which will reduce side

effects. Calcium channel blockers (CCBs) and angiotensin-converting enzyme (ACE) inhibitors can reduce cardiovascular disease morbidity and mortality.[31]

CONCLUSION

According to the findings of the current investigation, the study concludes that,polypharmacy was more frequently seen in hypertensive participants since several individual medicines were more prevalent among patients. Combinations of fixed doses might be prescribed to mitigate this. The majority of prescriptions in the current study lacked drugs prescribed in their generic names, and drug utilisation parameters using WHO basic drug indicators revealed that antibiotics and injections were overprescribed, which is a major factor in an upsurge in economic burden. Drugs prescribed under their generic names minimise medical ambiguity and enable the selection of superior substitutes. In light of the study's limitations, such as its small sample size and shart duration, we advise further improvement in the prescribing patterns of the medications, which can be accomplished by implementing specific interventions and conducting regular utilisation evaluations in the hospital context.

ACKNOWLEDGEMENT

ABBREVIATION

DUR: Drug utilization review, **HTN**: Hypertension, **WHO**: World health organization, **BMI:** Body mass index, **CV**: Cardiovascular, **CNS**: Central nervous system, **D** : Diuretics, **ACE**: Angiotensin converting enzyme, **ARB**: Angiotensin receptor blockers, **CCB**: Calcium channel blockers, **BB**: Beta blockers, **SD**: Standard deviation.

SUMMARY

An efficient tool for ensuring that the use of different medications is appropriate is drug utilization review. In order to achieve the best outcome in the shortest amount of time at the most affordable price, rational drug prescribing involves using the fewest number of drugs possible. The current study aids in determining a patient's drug prescribing habits and the most frequently prescribed antihypertensive medications. In our study, we observed polypharmacy and a very high percentage of injection exposure. The majority of prescriptions did not include the generic names of the drugs. The largest single component of direct expenses is the cost of medications. A strong correlation existed between the high cost of hypertension and hospitalization, multiple medications, and comorbidities. Being a developing nation, India faces many challenges, including the cost of medical care. In order to lessen the economic impact, emphasis should be placed on educating the public about their medications, lifestyle choices, and government programs.

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