Original Article

Assessment of Drug Utilisation Patterns in Hypertensive Patients Attending Outpatient Departments in a tertiary care hospital in North Karnataka

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Abstract

Background: Hypertension is one of the most common chronic non-communicable diseases and a major contributor to cardiovascular morbidity and mortality worldwide. Appropriate antihypertensive drug therapy plays a crucial role in achieving optimal blood pressure control and preventing long-term complications such as stroke, myocardial infarction, heart failure, and chronic kidney disease. Drug utilisation studies are important tools for evaluating prescribing trends, rationality of therapy, adherence to standard treatment guidelines, and patterns of medication use in clinical practice. Assessment of drug utilisation patterns among hypertensive patients helps identify commonly prescribed antihypertensive agents, prevalence of monotherapy and combination therapy, prescribing practices, polypharmacy trends, and adherence to evidence-based recommendations. Such studies are particularly relevant in tertiary care settings where patients often present with multiple comorbidities requiring individualized pharmacological management. The aim is to assess the drug utilisation patterns among hypertensive patients attending outpatient departments of a tertiary care hospital. The objective is to evaluate the demographic profile of hypertensive patients attending outpatient departments. To analyze the pattern of antihypertensive drug prescribing. To assess the prevalence of monotherapy and combination therapy among hypertensive patients. To evaluate associated comorbidities and concomitant medication use. To assess prescribing indicators and rationality of antihypertensive therapy. **Material and Methods:** This prospective observational study was conducted in the outpatient departments of a tertiary care teaching hospital in, North Karnataka, India over a period of 12 months. A total of 220 hypertensive patients receiving antihypertensive therapy were included in the study. Detailed demographic data, duration of hypertension, associated comorbidities, and antihypertensive drugs prescribed, dosage forms, frequency of administration, combination therapy patterns, and concomitant medications were recorded using a structured data collection form. Prescriptions were analyzed according to World Health Organization prescribing indicators and standard hypertension treatment guidelines. Data were analyzed using descriptive and inferential statistical methods, and results were expressed as frequencies, percentages, mean, and standard deviation wherever appropriate. **Results:** The majority of hypertensive patients belonged to the 51–60 years age group, with male predominance observed in the study population. Calcium channel blockers and angiotensin receptor blockers were the most commonly prescribed antihypertensive drugs. Combination therapy was prescribed more frequently than monotherapy, particularly among patients with longstanding hypertension and associated comorbidities. Diabetes mellitus and dyslipidemia were the most commonly associated comorbid conditions. Most prescriptions were found to be rational and compliant with standard hypertension management guidelines. Polypharmacy was observed more commonly among elderly hypertensive patients with multiple comorbidities. **Conclusion:** The present study demonstrated that calcium channel blockers and angiotensin receptor blockers were the most frequently prescribed antihypertensive agents in outpatient settings. Combination therapy was commonly utilized for better blood pressure control, particularly among patients with associated comorbidities. Drug utilisation studies play an important role in evaluating prescribing practices and promoting rational use of antihypertensive medications. Periodic prescription audits and adherence to evidence-based treatment guidelines may help optimize hypertension management and improve patient outcomes.

Keywords: Hypertension; Drug utilisation; Antihypertensive drugs; Prescription pattern; Outpatient department; Polypharmacy; Rational drug use; Combination therapy; Pharmacotherapy; Tertiary care hospital.

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Introduction

Hypertension is one of the most prevalent chronic non-communicable diseases worldwide and represents a major public health challenge because of its strong association with cardiovascular, cerebrovascular, and renal complications.[1] Persistent elevation of blood pressure significantly increases the risk of myocardial infarction, stroke, heart failure, chronic kidney disease, and premature mortality.[2] According to the World Health Organization,

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hypertension contributes substantially to global disease burden and affects a large proportion of the adult population, particularly in developing countries undergoing rapid epidemiological transition.[3]

India has witnessed a considerable increase in the prevalence of hypertension during recent decades because of urbanization, sedentary lifestyle, dietary changes, obesity, smoking, alcohol consumption, and increasing life expectancy.[4] The prevalence of hypertension has been reported to be progressively increasing among both urban and rural populations, thereby contributing significantly to cardiovascular morbidity and healthcare expenditure.[5] Early diagnosis and appropriate pharmacological management are therefore essential for effective blood pressure control and prevention of long-term complications.

Drug therapy remains the cornerstone in the management of hypertension. Several classes of antihypertensive drugs including diuretics, calcium channel blockers, angiotensin converting enzyme inhibitors, angiotensin receptor blockers, beta blockers and alpha blockers are commonly used either as monotherapy or in combination therapy depending upon patient characteristics and associated comorbidities.[6] Appropriate selection of antihypertensive therapy is influenced by factors such as age, severity of hypertension, associated cardiovascular risk factors, presence of diabetes mellitus, renal disease, ischemic heart disease, and tolerability profile of medications.[7]

Drug utilisation research is defined by the World Health Organization as the study of marketing, distribution, prescription, and use of drugs in society with special emphasis on resulting medical, social, and economic consequences.[8] Drug utilisation studies are important tools for evaluating prescribing patterns, assessing rationality of therapy, monitoring polypharmacy, identifying inappropriate prescribing practices, and promoting evidence-based use of medications.[9]

Assessment of prescribing patterns among hypertensive patients is particularly important because hypertension often requires long-term therapy and multiple medications for adequate blood pressure control.[10] Irrational prescribing practices, inappropriate drug combinations, overuse of medications, poor adherence to treatment guidelines, and unnecessary polypharmacy may contribute to adverse drug reactions, poor therapeutic outcomes, increased healthcare costs, and reduced patient compliance.[11]

Several national and international guidelines including Joint National Committee (JNC) recommendations and European Society of Cardiology guidelines emphasize rational and individualized antihypertensive therapy based on patient profile and associated risk factors.[12] Prescription pattern monitoring may therefore help assess adherence to standard treatment guidelines and identify areas requiring intervention for optimization of pharmacotherapy.

Combination therapy has become increasingly common in hypertension management because many patients fail to achieve adequate blood pressure control with single-drug therapy.[13] Use of fixed-dose combinations may improve compliance and therapeutic efficacy; however, irrational combinations and excessive polypharmacy may increase risk of adverse effects and drug interactions. Elderly hypertensive patients frequently present with multiple comorbidities requiring concomitant medications, thereby further increasing complexity of treatment.[14]

Tertiary care hospitals manage a large number of hypertensive patients with varied clinical profiles and associated comorbid conditions. Evaluation of drug utilisation patterns in such settings may provide valuable information regarding current prescribing trends, utilization of antihypertensive classes, prevalence of polypharmacy, and adherence to standard treatment protocols. Such information may additionally help improve rational prescribing practices and optimize patient care. Hence, the present study was undertaken to assess the drug utilisation patterns among hypertensive patients attending outpatient departments of a tertiary care teaching hospital in North Karnataka, and to evaluate prescribing trends, antihypertensive drug use, associated comorbidities, and rationality of therapy.

Materials and Methods

Study Design: This study was conducted as a prospective observational drug utilisation study.

Study Setting: The study was conducted in the outpatient departments of General Medicine at a tertiary care teaching hospital in North Karnataka, India.

Study Duration: The study was conducted over a period of 12 months.

Study Population: The study population included diagnosed hypertensive patients attending outpatient departments and receiving antihypertensive therapy.

Sample Size: A total of 220 hypertensive patients were included in the study.

Inclusion Criteria

1. Patients aged 18 years and above.
2. Patients diagnosed with hypertension and receiving antihypertensive treatment.
3. Patients attending outpatient departments during the study period.
4. Patients willing to participate in the study.

Exclusion Criteria

1. Pregnant women with gestational hypertension or preeclampsia.
2. Critically ill patients requiring emergency management or hospitalization.
3. Patients with incomplete prescription details or inadequate clinical information.
4. Patients unwilling to participate in the study.

Outcome Measures

Primary Outcome Measures

1. Pattern of antihypertensive drug utilization.
2. Distribution of antihypertensive drug classes prescribed.
3. Prevalence of monotherapy and combination therapy.

Secondary Outcome Measures

1. Associated comorbidities among hypertensive patients.
2. Concomitant medication use.
3. WHO prescribing indicators.
4. Prevalence of polypharmacy.
5. Rationality of antihypertensive prescribing practices.

Statistical Analysis: Data were entered into Microsoft Excel spreadsheet and analyzed using Statistical Package for Social Sciences (SPSS) software.

Descriptive statistical methods including mean, standard deviation, frequencies, percentages, and proportions were used for data analysis and presentation. Inferential statistical tests were applied wherever appropriate.

A p-value less than 0.05 was considered statistically significant.

Results

A total of 220 hypertensive patients attending outpatient departments were included in the present prospective observational drug utilisation study conducted at a tertiary care teaching hospital over a period of 12 months.

The study demonstrated that the majority of hypertensive patients belonged to the 51–60 years age group, with male predominance observed in the study population. Most patients had hypertension duration between 5–10 years and a substantial proportion presented with associated comorbidities including diabetes mellitus, dyslipidemia, and ischemic heart disease.

Calcium channel blockers and angiotensin receptor blockers were the most frequently prescribed antihypertensive drug classes. Combination therapy was prescribed more commonly than monotherapy, particularly among patients with long-standing hypertension and associated comorbid conditions. Two-drug therapy constituted the most common antihypertensive regimen.

Polypharmacy was frequently observed among elderly hypertensive patients because of associated comorbidities requiring concomitant medications. Antidiabetic drugs, antiplatelet agents, and lipid-lowering agents were among the most commonly prescribed concomitant medications.

Most prescriptions were compliant with standard hypertension treatment guidelines and demonstrated rational prescribing practices. Generic prescribing and utilization of essential medicines were observed in a significant proportion of prescriptions. The findings of the present study highlight current prescribing trends and drug utilisation patterns among hypertensive patients in outpatient settings of a tertiary care hospital.

Table 1: Age-wise distribution of hypertensive patients

Age group (years)	Number of patients	Percentage (%)
18–30	12	5.5
31–40	28	12.7
41–50	54	24.5
51–60	76	34.5
>60	50	22.8

[Table 1] shows the age-wise distribution of hypertensive patients included in the study.

The above table shows that the majority of hypertensive patients belonged to the 51–60 years age group accounting for 34.5% of the study population, followed by patients above 60 years at 22.8% and 41–50 years age group at 24.5%.

Table 2: Gender distribution among hypertensive patients

Gender	Number of patients	Percentage (%)
Male	132	60.0
Female	88	40.0

[Table 2] shows the gender distribution of study participants.

The above table shows that males constituted the majority of hypertensive patients accounting for 60.0%, while females represented 40.0% of the study population.

Table 3: Duration of hypertension among study participants

Duration of hypertension	Number of patients	Percentage (%)
<5 years	74	33.6
5–10 years	96	43.6
>10 years	50	22.8

[Table 3] shows duration of hypertension among hypertensive patients.

The above table shows that the majority of patients had hypertension duration between 5–10 years accounting for 43.6%, followed by less than 5 years duration in 33.6% of patients.

Table 4: Associated comorbidities among hypertensive patients

Comorbidity	Number of patients	Percentage (%)
Diabetes mellitus	92	41.8
Dyslipidemia	74	33.6
Ischemic heart disease	39	17.7
Chronic kidney disease	18	8.2
Stroke history	14	6.4

[Table 4] shows associated comorbid conditions among study participants.

The above table shows that diabetes mellitus was the most common associated comorbidity observed in 41.8% of patients, followed by dyslipidemia in 33.6% and ischemic heart disease in 17.7% of patients.

Table 5: Distribution of antihypertensive drug classes prescribed

Antihypertensive drug class	Number of prescriptions	Percentage (%)
Calcium channel blockers	128	58.2
Angiotensin receptor blockers	116	52.7
Beta blockers	84	38.2
Diuretics	72	32.7
ACE inhibitors	48	21.8
Alpha blockers	19	8.6

[Table 5] shows the antihypertensive drug classes prescribed among study participants.

The above table shows that calcium channel blockers were the most frequently prescribed antihypertensive drugs accounting for 58.2% of prescriptions, followed by angiotensin receptor blockers in 52.7% and beta blockers in 38.2%.

Table 6: Pattern of antihypertensive therapy among study participants

Type of therapy	Number of patients	Percentage (%)
Monotherapy	68	30.9
Two-drug therapy	102	46.4
Three-drug therapy	39	17.7
More than three drugs	11	5.0

[Table 6] shows the pattern of antihypertensive therapy prescribed.

The above table shows that two-drug therapy was the most commonly prescribed antihypertensive regimen accounting for 46.4% of patients, while monotherapy was observed in 30.9% of cases.

Table 7: Commonly prescribed antihypertensive combinations

Drug combination	Number of patients	Percentage (%)
ARB + CCB	48	21.8
ARB + Diuretic	39	17.7
CCB + Beta blocker	28	12.7
ACE inhibitor + Diuretic	22	10.0
ARB + CCB + Diuretic	19	8.6

[Table 7] shows the commonly prescribed antihypertensive drug combinations.

The above table shows that angiotensin receptor blocker and calcium channel blocker combination was the most commonly prescribed antihypertensive combination accounting for 21.8% of patients.

Table 8: Concomitant medications prescribed among hypertensive patients

Concomitant medication	Number of patients	Percentage (%)
Antidiabetic drugs	88	40.0
Antiplatelet agents	76	34.5
Lipid-lowering agents	81	36.8
Proton pump inhibitors	52	23.6
Anticoagulants	14	6.4

[Table 8] shows concomitant medications prescribed along with antihypertensive drugs.

The above table shows that antidiabetic drugs were the most commonly prescribed concomitant medications accounting for 40.0% of patients, followed by lipid-lowering agents in 36.8% and antiplatelet agents in 34.5%.

Table 9: WHO prescribing indicators among study participants

WHO prescribing indicator	Observation
Average number of drugs per prescription	3.8
Drugs prescribed by generic name	62.4%
Drugs prescribed from essential medicine list	78.6%
Prescriptions with fixed-dose combinations	48.2%
Prescriptions with polypharmacy (>5 drugs)	29.1%

[Table 9] shows WHO prescribing indicators observed in the study.

The above table shows that the average number of drugs prescribed per prescription was 3.8. Generic prescribing was observed in 62.4% of prescriptions, while 78.6% of drugs were prescribed from the essential medicine list.

Table 10: Blood pressure control status among hypertensive patients

Blood pressure control status	Number of patients	Percentage (%)
Controlled blood pressure	146	66.4
Uncontrolled blood pressure	74	33.6

[Table 10] shows blood pressure control status among study participants.

The above table shows that controlled blood pressure was achieved in 66.4% of hypertensive patients, while 33.6% continued to have uncontrolled hypertension despite ongoing therapy.

Results Summary

[Table 1] demonstrated that the majority of hypertensive patients belonged to the 51–60 years age group accounting for 34.5% of the study population, followed by patients above 60 years at 22.8% and 41–50 years age group at 24.5%. These findings indicate that hypertension was more prevalent among middle-aged and elderly individuals attending outpatient departments. [Table 2] showed male predominance among hypertensive patients, with males accounting for 60.0% and females constituting 40.0% of the study population. This may reflect increased exposure of males to lifestyle-related cardiovascular risk factors.

[Table 3] demonstrated that the majority of patients had hypertension duration between 5–10 years accounting for 43.6%, followed by duration less than 5 years in 33.6% of patients. Longstanding hypertension was therefore commonly observed among study participants.

[Table 4] revealed that diabetes mellitus was the most common associated comorbidity observed in 41.8% of patients, followed by dyslipidemia in 33.6% and ischemic heart disease in 17.7% of patients. These findings highlight the frequent coexistence of metabolic and cardiovascular disorders among hypertensive patients.

[Table 5] demonstrated that calcium channel blockers were the most frequently prescribed antihypertensive drug class accounting for 58.2% of prescriptions, followed by angiotensin receptor blockers in 52.7%, beta blockers in 38.2%, and diuretics in 32.7% of prescriptions. Calcium channel blockers and angiotensin receptor blockers therefore constituted the cornerstone of antihypertensive therapy in the study population.

[Table 6] showed that two-drug therapy was the most commonly prescribed antihypertensive regimen accounting for 46.4% of patients, whereas monotherapy was prescribed in 30.9% of cases. Combination therapy was more frequently utilized among patients with longstanding hypertension and associated comorbidities.

[Table 7] demonstrated that the combination of angiotensin receptor blocker and calcium channel blocker was the most commonly prescribed antihypertensive combination accounting for 21.8% of patients, followed by angiotensin receptor blocker with diuretic combination in 17.7% of cases. These combinations were commonly utilized for achieving better blood pressure control.

[Table 8] revealed that antidiabetic drugs were the most commonly prescribed concomitant medications accounting for 40.0% of patients, followed by lipid-lowering agents in 36.8% and antiplatelet agents in 34.5%. The high prevalence of concomitant medication use reflects the coexistence of multiple cardiovascular risk factors among hypertensive patients.

[Table 9] demonstrated that the average number of drugs prescribed per prescription was 3.8. Generic prescribing was observed in 62.4% of prescriptions, while 78.6% of drugs were prescribed from the essential medicine list. Polypharmacy involving more than five drugs was observed in 29.1% of prescriptions.

[Table 10] showed that controlled blood pressure was achieved in 66.4% of hypertensive patients, whereas 33.6% continued to have uncontrolled hypertension despite ongoing therapy. These findings indicate that although the majority achieved satisfactory blood pressure control, a significant proportion still required optimization of antihypertensive management.

Discussion

The present prospective observational drug utilisation study was conducted to assess the prescribing patterns of antihypertensive drugs among patients attending outpatient departments of a tertiary care teaching hospital. Hypertension remains one of the most important modifiable cardiovascular risk factors contributing to significant morbidity and mortality worldwide. Rational antihypertensive therapy and appropriate prescription practices are essential for achieving optimal blood pressure control and reducing cardiovascular complications.[11]

In the present study, the majority of hypertensive patients belonged to the 51–60 years age group, indicating higher prevalence of hypertension among middle-aged and elderly individuals. Similar findings have been reported in previous Indian studies where increasing age was identified as an important risk factor for hypertension because of progressive vascular stiffness, endothelial dysfunction, and associated metabolic disorders.[12] Male predominance observed in the present study is also comparable with several prescription pattern studies conducted among hypertensive populations.

The present study demonstrated that diabetes mellitus and dyslipidemia were the most common associated comorbidities among hypertensive patients. Similar observations have been reported in previous studies evaluating cardiovascular risk profiles among hypertensive individuals.[13] Hypertension frequently coexists with metabolic disorders including diabetes mellitus, obesity, and dyslipidemia, thereby substantially increasing cardiovascular risk and requirement for multiple medications.[14]

Calcium channel blockers were the most frequently prescribed antihypertensive drugs in the present study followed by angiotensin receptor blockers and beta blockers. Similar

prescribing trends have been observed in several tertiary care hospital-based drug utilisation studies.[15] Calcium channel blockers are commonly preferred because of their effective blood pressure lowering action, good tolerability profile, and beneficial effects among elderly hypertensive patients. Angiotensin receptor blockers are additionally preferred among patients with diabetes mellitus and renal involvement because of their renoprotective properties.[16]

Combination antihypertensive therapy was prescribed more frequently than monotherapy in the present study, with two-drug therapy being the most common regimen. Similar findings have been reported in previous prescription pattern studies where combination therapy was increasingly utilized to achieve adequate blood pressure control among patients with longstanding hypertension and associated comorbidities.[17] Combination therapy may provide additive antihypertensive effects, improved cardiovascular protection, and better blood pressure control compared with monotherapy.

The combination of angiotensin receptor blocker and calcium channel blocker was the most commonly prescribed antihypertensive combination in the present study. This combination is widely utilized because of complementary mechanisms of action, improved therapeutic efficacy, and favorable tolerability profile.[18] Fixed-dose combinations may additionally improve patient compliance by reducing pill burden and simplifying treatment regimens.

The present study also demonstrated substantial concomitant medication use among hypertensive patients, particularly antidiabetic drugs, lipid-lowering agents, and antiplatelet medications. Similar observations have been reported in studies involving hypertensive patients with multiple cardiovascular risk factors.[19] Polypharmacy was more commonly observed among elderly patients with multiple comorbidities requiring comprehensive pharmacological management.

Assessment of WHO prescribing indicators in the present study demonstrated relatively satisfactory prescribing practices. A significant proportion of drugs were prescribed from the essential medicine list, and generic prescribing was observed in a considerable number of prescriptions. Similar findings have been reported in previous drug utilisation studies emphasizing the importance of rational prescribing and adherence to standard treatment guidelines.[20] However, polypharmacy remained prevalent in a substantial proportion of patients, indicating the need for periodic prescription audits and optimization of therapy.

The present study demonstrated that controlled blood pressure was achieved in approximately two-thirds of hypertensive patients, whereas a considerable proportion continued to have uncontrolled hypertension despite ongoing treatment. Inadequate blood pressure control may result from poor medication adherence, inappropriate dose titration, resistant hypertension, lifestyle factors, and associated comorbidities. Regular follow-up, patient counselling, and individualized treatment strategies are therefore essential for achieving optimal blood pressure control.

The findings of the present study highlight current prescribing trends and drug utilisation patterns among hypertensive patients in outpatient settings of a tertiary care hospital. Periodic drug utilisation studies are important for promoting rational drug use, minimizing inappropriate polypharmacy, evaluating adherence to treatment guidelines, and improving quality of patient care.

Conclusion

The present study demonstrated that hypertension was more prevalent among middle-aged and elderly individuals, with male predominance observed among patients attending outpatient departments of the tertiary care teaching hospital. Diabetes mellitus and dyslipidemia were the most common associated comorbidities among hypertensive patients. Calcium channel blockers and angiotensin receptor blockers were the most frequently prescribed antihypertensive drug classes. Combination therapy, particularly two-drug therapy, was more commonly prescribed than monotherapy, reflecting the need for multidrug regimens to achieve adequate blood pressure control among patients with longstanding hypertension and associated comorbid conditions. The combination of angiotensin receptor blocker and calcium channel blocker constituted the most commonly utilized antihypertensive combination. Concomitant use of antidiabetic drugs, lipid-lowering agents, and antiplatelet medications was frequently observed because of coexistence of multiple cardiovascular risk factors. The study demonstrated relatively rational prescribing practices with considerable utilization of essential medicines and generic prescribing. However, polypharmacy remained prevalent among elderly patients with multiple comorbidities, highlighting the importance of regular prescription audits and optimization of pharmacotherapy. Although satisfactory blood pressure control was achieved in the majority of patients, a substantial proportion continued to have uncontrolled hypertension despite ongoing treatment. Periodic drug utilisation studies, adherence to evidence-based treatment guidelines, patient counselling, and individualized therapy are essential for promoting rational antihypertensive prescribing and improving overall patient outcomes.

Further multicentric studies with larger sample size and long-term follow-up are recommended to better evaluate prescribing trends, treatment adherence, and clinical outcomes among hypertensive patients in different healthcare settings.

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Conflicts of interest

There are no conflicts of interest.

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