International Journal of Basic & Clinical Pharmacology
Kedare RV et al. Int J Basic Clin Pharmacol. 2024 Jul;13(4):502-505
http://www.ijbcp.com
pISSN 2319-2003 | eISSN 2279-0780

DOI: https://dx.doi.org/10.18203/2319-2003.ijbcp20241650

Original Research Article

Antihypertensive drug prescription patterns and their impact on blood pressure outcomes in a tertiary care teaching hospital

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Received: 01 May 2024
Revised: 29 May 2024
Accepted: 31 May 2024

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ABSTRACT

Background: The guidelines from the Joint National Committee (JNC-8) emphasize the importance of rapid blood pressure (BP) control to reduce morbidity and mortality. The success of hypertension treatment depends on various factors, with irrational prescription being strongly linked to poor BP control. This study aimed to evaluate the patterns of antihypertensive drug prescriptions among patients in a tertiary care teaching hospital.
Methods: A hospital-based observational study was conducted in 2018, including all hypertensive patients on medication. Their prescription patterns were analyzed.
Results: The study analyzed prescriptions from 240 hypertensive patients. The mean ages for male and female patients were 56.68±15.32 and 62.29±12.65 years, respectively. Physicians commonly prescribed monotherapy (34.60%) followed by two-drug (18.40%), three-drug (11.80%), and four-drug combinations (3.00%). The most frequent two-drug combination was ACE inhibitors + diuretics (4.40%), followed by angiotensin receptor blockers (ARBs) + diuretics (3.60%) and calcium channel blockers (CCBs) + ACE inhibitors (2.60%). Adherence to JNC 8 guidelines was 19.3% for pre-hypertension, 88.70% for stage 1 hypertension, and 73.29% for stage 2 hypertension.
Conclusions: Monotherapies were the most commonly prescribed regimens. Twice-daily dosing and monthly appointments were associated with lower incidences of uncontrolled BP. However, complete adherence to standard guidelines was not observed in all cases, especially in patients with comorbid conditions.

Keywords: ACE inhibitors, Antihypertensive drugs, ARBs, CCBs, Diuretics, JNC-8 guidelines, Prescription patterns

INTRODUCTION

Hypertension (HTN) is a prevalent non-communicable disease in developing countries, requiring lifelong medication. It significantly contributes to heart disease, stroke, kidney failure, premature mortality, and disability, particularly affecting populations in low- and middle-income countries with weaker health systems. Various pharmacological treatments for HTN include diuretics, β-blockers, calcium channel blockers, and renin-angiotensin inhibitors, each with specific indications and benefits for patients with comorbid conditions.[1,2]

ACE inhibitors (ACEIs) are crucial for patients with diabetes mellitus (DM) as they can delay nephropathy. Rational prescription, in line with standard guidelines, is essential for effective hypertension control.[3,4] Irrational prescriptions, characterized by inappropriate doses,

frequencies, and durations, are linked to poor hypertension management, resulting in complications, additional expenses, adverse drug reactions, and distrust between patients and physicians.[5-7] Geriatric patients are particularly vulnerable to adverse drug reactions from irrational prescriptions. The JNC-8 guidelines, regarded as the "gold standard" for hypertension management, recommend targeting blood pressure below 150/90 mmHg for patients aged 60 and above. This study focuses on analyzing antihypertensive drug prescription patterns.

METHODS

Study design

The study was conducted at MIMER Medical College and Dr. Bhausaheb Sardesai Rural Hospital in Talegaon Dabhade, Pune, from June to December 2018.

Study population

Prescription patterns of 240 hypertensive patients were evaluated. Irrational prescriptions were defined as inappropriate drug choices, incorrect doses, frequencies, and durations, without considering patient costs. Prescriptions were analyzed using national and international clinical practice guidelines.[8-10]

Data collection

Data were collected by investigators at the medicine outpatient department (OPD) using a case record form to gather information on dose, frequency, duration, drug class, and interactions. Baseline BP recordings were taken from medical records. The proportion of patients on monotherapy, dual therapy, and triple therapy was calculated.

Data analysis

Data were analyzed using SPSS software, with descriptive statistics used to describe sociodemographic characteristics.

Ethics clearance

Approval was obtained from the institutional ethics committee (IEC) before starting the study.

RESULTS

Baseline demographic characteristics

The mean age of male patients was 56.96±14.60 years, while that of female patients was 62.29±12.65 years.

Age distribution among males and females was similar, with a significant proportion being above 60 years (Table 1).

Table 1: Baseline demographic characteristics of hypertensive patients (n=240).

Age (years)	Males (n=142)	Females (n=98)
Mean±SD	56.96±14.60	62.29±12.65
<40	35 (24.64%)	24 (24.48%)
40-60	51 (35.91%)	33 (33.67%)
Above 60	56 (39.43%)	41 (41.83%)

Comorbid conditions

The most common comorbid conditions were acid peptic disease (20.00%), dyslipidemia (17.91%), and diabetes mellitus (15.83%) (Table 2).

Table 2: Comorbid conditions of study participants.

Co-morbidities	Males (n=142)	Females (n=98)	Total	Percentage
Diabetes mellitus (%)	23	15	38	15.83
Cardio vascular diseases (%)	16	08	24	10.00
Renal diseases (%)	12	06	18	07.50
Liver diseases (%)	05	01	06	02.50
Hypothyroidism (%)	08	08	16	06.66
Pulmonary disease (%)	11	02	13	05.41
Acid peptic disease (%)	26	22	48	20.00
Obesity/overweight (%)	18	16	34	14.16
Dyslipidaemia (%)	23	20	43	17.91

Antihypertensive drug use

Single drug therapy was prescribed to 34.60% of patients, with diuretics (10.20%) being the most common, followed by ACE inhibitors (6.60%). Two-drug therapy was prescribed to 18.40% of patients, with ACE inhibitors + diuretics (4.40%) being the most common combination. Three-drug and four-drug therapies were less common (Table 3).

Table 3: Antihypertensive drugs used in mono and combination therapies (n=240).

Treatment	Percentage N (%)
Single drug therapy	83 (34.60)
ACE inhibitor (ACEI)	16 (06.60)
Angiotensin receptor blocker (ARBs)	13 (05.60)
Diuretics	24 (10.20)
Calcium channel blockers	18 (07.60)
Beta blockers	09 (03.60)
Alpha agonists	02 (01)
Two-drugs therapy	21 (18.40)
Angiotensin receptor blockers + diuretics	09 (03.60)
Calcium channel blockers + β-blockers	05 (02)
Diuretics + calcium channel blockers	04 (01.60)
ACE inhibitors + diuretics	11 (04.40)
Diuretics + β-blockers	02.40 (01)
Calcium channel blockers + ARBs	05 (02.20)
Calcium channel blockers + ACEIs	06 (02.60)
ACEIs/ARBs + β-blockers	02 (00.80)
Calcium channel blockers + α-agonists	0.5 (00.20)
ACEs + ARBs	00
Three Drugs therapy	13.44 (11.80)
CCBs + ACEIs/ ARBs + diuretics	10.08 (04.20)
ARBs + Diuretics + CCBs	06 (02.40)
ACEIs/ARBs + BBs + CCBs	08 (03.40)
ACEIs/ARBs + BBs + diuretics	04.30 (01.80)
Four Drugs therapy	03.36 (03)
Diuretics + calcium channel blockers + β-blockers + ARBS	01.50 (01.20)
ARBs+ 2 diuretics + calcium channel blockers	04.30 (01.80)
Combination with other drugs	77 (32.20)

Table 4: Adherence to JNC-8 hypertension treatment recommendations.

JNC HTN classification	Recommendations	Adherence rate
Stage 1	Single drug therapy	
	Hydrochlorothiazide	40.94%
	Enalapril	11.63%
	Losartan	14.39%
	Atenolol	05.50%
Stage 2	Two drug therapy	
	Enalapril + Hydrochlorothiazide	11.02%
	Losartan + Hydrochlorothiazide	16.60%
	Amlodipine + Enalapril	07.38%
	Losartan + Amlodipine	04.09%

DISCUSSION

Effective BP control requires appropriate medication, dosage, frequency, and duration. The study found that twice-daily dosing and monthly appointments were associated with better BP control compared to once-daily dosing.[11-13] The frequency of dosing and patient compliance play crucial roles in achieving BP control. Elderly patients and those with comorbid conditions such as DM and chronic kidney disease often require ACE inhibitors to manage their conditions effectively.[14-17] The JNC-8 guidelines are conservative in their approach to antihypertensive medication provision, focusing on good BP control outcomes. Regular organ function tests before initiating antihypertensive medications can reduce the risk of uncontrolled BP and adverse drug reactions.[18-20]

CONCLUSION

Monotherapies were the most commonly prescribed, followed by dual and triple therapies. Diuretics were preferred in monotherapy, while ACE inhibitors were common in dual therapy. Adherence to standard guidelines, twice-daily dosing, monthly appointments, and organ function tests were associated with lower incidences of uncontrolled BP. Clinicians should stratify patients based on organ failure risk and consider regimen changes if BP control is not achieved.

ACKNOWLEDGEMENTS

The authors acknowledge the department of medicine and department of pharmacology at MIMER Medical College and Dr. Bhausaheb Sardesai Talegaon Rural Hospital for their support.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

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Cite this article as: Kedare RV, Pujari AJ, Hivale N, Kharat R. Antihypertensive drug prescription patterns and their impact on blood pressure outcomes in a tertiary care teaching hospital. Int J Basic Clin Pharmacol 2024;13:502-5.