

Trend of Antihypertensive Use and Blood Pressure Control Among Hypertensive Patients in a Tertiary Care Hospital of Kathmandu

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ABSTRACT

Introduction

Hypertension is a global burden and prevalence of hypertension increases with age. Various antihypertensive drugs are available for the management of hypertension. The aim of this study is to assess the trend of antihypertensive drugs used and blood pressure (BP) control among patients with hypertension.

Methods

A cross sectional study was conducted among patients with hypertension prescribed with antihypertensive drugs in Department of Medicine, Nepal Medical College Teaching Hospital. Antihypertensive drugs, number of antihypertensive drugs prescribed in each individual and BP were analyzed.

Results

Out of 218 patients, 61.5% were female and 38.5% were male. Common age group range from 51-60 years in 28.4% of patients. Diabetes mellitus (23.4%) was the most common comorbid condition. Dual therapy (47.6%) followed by monotherapy (45.9%) was the most common therapy prescribed for patients with hypertension. Most commonly prescribed antihypertensive as monotherapy was Calcium Channel Blockers (CCBs), 29.4% and in dual therapy, CCBs and Angiotensin Receptor Blockers (ARBs), 38.6% were the most commonly prescribed medications. Fixed dose combination of antihypertensive drugs were prescribed in 81.4% patients receiving multiple therapy. Good BP control was observed in 61.2% of patients with hypertension.

Conclusion

Dual therapy followed by monotherapy was the most common therapy prescribed for the management of hypertension. Calcium channel blockers as monotherapy and CCBs and ARBs as combination therapy were the most common antihypertensive drugs prescribed for hypertension. More than half the patients had controlled BP. A therapeutic audit with more parameters of analysis to provide regular feedback to researchers and prescribers may encourage rational prescribing in hypertension.

Keywords

Antihypertensives, blood pressure, hypertension

INTRODUCTION

The global burden of hypertension is alarmingly high and its prevalence increases with advancing age.¹ According to an estimate by World Health Organization (WHO), 1.28 billion adults aged 30-79 years worldwide have hypertension, and about two-thirds of them live in low- and middle-income countries.² In Nepal, the prevalence of hypertension has been estimated to be 28.52% by a meta-analysis study.³ Rise in both systolic and diastolic pressure is associated with an increase in cardiovascular morbidity and mortality.⁴ Approximately 1 in 5 adults (21%) with hypertension have it under control.² Decreasing systolic and diastolic pressure by approximately 10 and 5 mm Hg respectively reduces stroke risk by 35-40% and risk of coronary artery disease by 12-16% within five years of treatment duration.⁵ Therefore it is important to control increased blood pressure.

Single drug use as monotherapy or different agents as combined agents are used to treat hypertension.^{5,6} Despite all, many patients of hypertension are under treated and their target blood pressure is not achieved even in developed countries. There is very limited data on prescription of antihypertensive drugs usage and the control of blood pressure. Therefore, this study was carried out to assess the current trend of pattern of antihypertensive drugs used and BP control among patients with hypertension in Medicine Department.

METHODS

A hospital based cross-sectional study was conducted in Nepal Medical College Teaching Hospital (NMCTH), Attarkhel, Gokerneshwor-8, Kathmandu from November 2021 to February 2022 after the ethical approval from Institutional Ethics Committee in Nepal Medical College. This study was conducted in patients with hypertension attending in Medicine out-patient department.

Sample size was determined by the formula: $n = (z^2 pq) / d^2$, where, 'n' is sample size, 'z' is standard normal deviate; usually set at 1.96, which corresponds to 95% confidence level, 'p' is the prevalence of patients with hypertension, =28.52%,³ 'q' is 100-p, i.e. =100-28.52 =71.48% and 'd' is margin of error, i.e. =6%. By using the formula, $n = ((1.96)^2 \times 28.52 \times 71.48) / 6^2$. Thus $n = 217.54$. Hence, 218 patients were studied. Patients visiting Medicine OPD, age above 18 years and patient diagnosed with hypertension and taking antihypertensive medicine for at least 3 months were included in this study. Newly diagnosed hypertension, pregnant females, unwilling to participate were excluded from the study. Patients were explained about the aim of the study. Written informed consent was taken from the participants.

Patient demographic profile, antihypertensive drugs, number of antihypertensive drugs, BP etc. were filled up in the pre-designed proforma. Participant BPs was measured in a sitting position, after 5 minutes of rest, on the right arm, and using a mercury sphygmomanometer that was placed at the level of the heart. The systolic and diastolic pressures was read to the nearest 2 mmHg. Systolic BP and diastolic BP was taken at phase 1 and phase 5 of Korotkoff sounds, respectively. The highest of 3 consecutive BP readings taken at 5-minute interval was recorded. Good BP control was defined as a BP < 140/90 mmHg in general population <60 years, Diabetes mellitus (DM) and Chronic kidney disease (CKD); BP <150/90mmHg in general population >or = 60 years.⁶ The collected data was analyzed with SPSS software version 16.00. The result was expressed in number and percentage.

RESULTS

Out of 218 patients, 134 (61.5%) were female and 84 (38.5%) were male. Most common age group

Table 1. Demographic profile of the patient (n=218)

Characteristics	Number (%)
Gender	
Female	134 (61.5)
Male	84 (38.5)
Age (years)	
<30 years	12 (5.5)
31-40	24 (11)
41-50	48 (22)
51-60	62 (28.4)
61-70	51 (23.4)
70-80	12 (5.5)
>81 years	9 (4.1)
Coexisting disease*	
Absent	130 (59.6)
Present	88 (40.4)
Diabetes mellitus	51 (23.4)
Dyslipidemia	17 (7.8)
Chronic Kidney Disease	14 (6.4)
Chronic Obstructive Pulmonary Disease	9 (4.1)
Hypothyroidism	7 (3.2)
Coronary artery disease	3 (1.4)
Asthma	2 (0.9)
Chronic Liver Disease	2 (0.9)
Deep Vein Thrombosis	1 (0.5)
Cerebral Vascular Accident	1 (0.5)
Rheumatoid Arthritis	1 (0.5)
Blood pressure control	
Good	134 (61.2)
Poor	84 (38.5)

* ≥ 1 coexisting disease in patients

Table 2. Antihypertensive medications used in hypertensive patients

Therapy and Drug Class	Number (%)
Monotherapy	100 (45.9)
Combination therapy	118 (54.1)
Dual therapy	104 (47.6)
Triple therapy	13 (6)
Quadruple therapy	1 (0.5)
Monotherapy	100 (45.9)
CCB	64 (29.4)
ARB	34 (15.6)
BB	2 (0.9)
Dual therapy	104 (47.6)
CCB+ARB	84 (38.6)
ARB+TD	8 (3.7)
CCB+High ceiling diuretics	4 (1.8)
CCB+Alpha blockers	2 (0.9)
CCB+BB	2 (0.9)
CCB+TD	2 (0.9)
ARB+Alpha blockers	1 (0.5)
ARB+BB	1 (0.5)
Triple therapy	13 (6)
CCB+ARB+TD	3 (1.4)
CCB+BB+TD	2 (0.9)
CCB+Alpha blocker+High ceiling diuretics	2 (0.9)
CCB+ ARB+Alpha blocker	2 (0.9)
CCB+ARB+BB	1 (0.5)
CCB+BB+High ceiling diuretics	1 (0.5)
CCB+High ceiling diuretics+ Potassium sparing diuretics	1 (0.5)
ARB+BB+Thiazide	1 (0.5)
Quadruple therapy	1 (0.5)
CC+BB+TD+ARB	1 (0.5)

ARB : Angiotensin receptor blockers,

BB : Beta blockers,

CCB : Calcium channel blockers (Dihydropyridines),

TD : Thiazide diuretics

range from 51-60 years, 62 (28.4%), followed by 61-70 years, 51 (23.4%) and 41-50 years, 48 (22%). Comorbidities were present in 88 (40.4%) patients. Diabetes mellitus was seen as the most common comorbid condition in about 51 (23.4%) patients, followed by dyslipidemia 17 (7.8%), CKD 14 (6.4%) and chronic obstructive pulmonary disease (COPD) 9 (4.1%) as shown in table 1. In our study, 104 (47.6%) of patients were most commonly prescribed with dual therapy followed by monotherapy 100 (45.9%), triple therapy 13 (6%) and quadruple therapy 1(0.5%) as shown in Figure 1.

Table 2 shows different group of antihypertensive drugs prescribed in a patient. Calcium channel blockers (CCBs) were the most commonly prescribed antihypertensive medications as

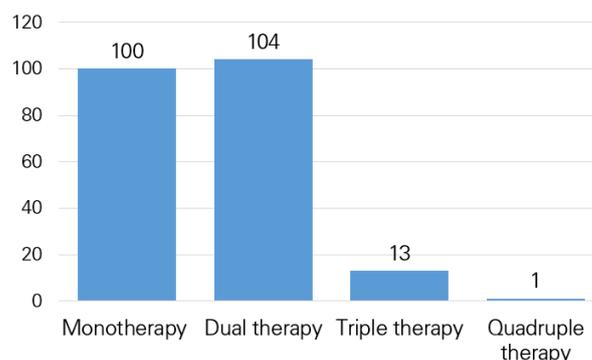


Figure 1. Number of drugs prescribed in each prescription (n = 218)

monotherapy in 64 (29.4%) patients, followed by angiotensin receptor blockers (ARBs) in 34 (15.6%) patients. In dual therapy, CCBs+ARBs were the most commonly prescribed in 84 (38.6%) patients, followed by ARBs+ TD (thiazide diuretics) in 8 (3.7%) patients. Similarly in triple therapy CCB+ARB+TD were prescribed in 3 (1.4%) patients. Among the patients receiving multiple therapy, 96 (81.4%) patients received fixed dose combination (FDC) of antihypertensive drugs. In our study, good control of BP was observed in 134 (61.2%) patients (Table 1).

DISCUSSION

Hypertension is one of the most common non communicable disease over worldwide. It is a primary risk factors for several clinical conditions like stroke, ischemic heart disease, heart failure and peripheral arterial disease, kidney disease as well as dementia due to cerebral small vessel disease.⁷ Various guidelines are formulated for better treatment, less adverse effects and cost effective.⁸ Prescription analysis are important for our healthcare system to perform medical audits and promote the health and wellbeing of the community by scrutinizing and promoting therapeutic regimens. Such studies are crucial for refinement of clinical practice because they are the foundations for formulation and execution of drug prescribing and drug dispensing policies at the local as well as national level.

In this study it was observed that the incidence of hypertension was higher in female which is similar to other studies in which female were found to be more common.⁹⁻¹¹ The present study observed that hypertension was more common in patients of age group 51-60 years followed by 61-70 years and 41-50 years which is similar to the study done by Kumar et al, in which 41-50 years (34%) followed by 51-60 (28%) and 61-70 (16%) were the common age group.¹² Other studies also found that hypertension was more common in age above 40 years.^{11,13} Prevalence of hypertension increases with age due

to increased arterial wall stiffness that occurs due to increased metabolic disorder, inflammation and neurohormonal disorder.¹

In this study, 40.4% of the patients showed one or more comorbidities. DM was the most common comorbidity associated with hypertension. Similar study were also seen in other studies where DM was the common comorbidity associated with hypertension.^{9,10,13} Hypertension and DM are common comorbidities. Hypertension is twice as frequent in patients with diabetes compared with those who do not have diabetes.¹⁴

Most of the antihypertensive drugs were prescribed in dual therapy which is similar to other studies done by Adejumo et al and Kumar et al where dual therapy was commonly seen in 49.6% and 61% respectively.^{11,12} As per guidelines, monotherapy is the first line of treatment followed by dual and multiple therapy if not controlled by monotherapy.

In our study, CCBs were the most commonly used antihypertensive drugs as monotherapy and CCBs and ARBs were the most commonly prescribed combination in the dual therapy. Similar study was also seen in previous studies done by Ahmed et al and Lamsal et al.^{13,15} Joint national committee (JNC) 8 recommends the use of ACEIs, ARBs, thiazide diuretics and CCBs alone or in combination for management of hypertension, thus suggesting trend of prescription is in conformity with guidelines.⁶ Among the multiple antihypertensive drugs use, majority of the patients were prescribed with FDC. Fixed dose combination is a rational approach for achieving optimal therapeutic benefits while minimizing pill-burden. Decrease in number of medicines will be convenient for the patients and lead to more therapeutic adherence, resulting in better clinical outcomes and cost-effectiveness.¹⁶

Good BP control was observed in 61.2 % of patients in this study. Similarly Good BP control was seen in 49.6% using the same criteria.¹⁷ Controlled BP prevents from further complication of hypertension. Apart from pharmacotherapy, life style modification such as alcohol and sodium intake, smoking cessation, physical activity level and dietary pattern play the greater role in controlling the BP.¹⁸ Adherence to medicine also play the important role in controlling BP.^{19, 20}

CONCLUSION

The current study shows that dual therapy followed by monotherapy was the most common therapy prescribed for the management of hypertension. Calcium channel blockers as monotherapy and CCBs and ARBs as combination therapy were the most common antihypertensive drugs prescribed for hypertension. More than half the patients had controlled BP. Regular therapeutic audits, including

more parameters in analysis and providing regular feedback to prescribers will be immensely beneficial for encouraging rational prescribing in hypertension.

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CONFLICT OF INTEREST

The author(s) declare that they do not have any conflicts of interest with respect to the research, authorship, and/or publication of this article.

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REFERENCES

1. Zhongjie Sun. Aging, Arterial Stiffness, and Hypertension. *Hypertension* 2015; 65: 252-6. doi: 10.1161/hypertensionaha.114.03617
2. World Health Organization (WHO). Hypertension [Internet]. Available at: <https://www.who.int/news-room/fact-sheets/detail/hypertension>. [Accessed on 4th Sept, 2021].
3. Shrestha DB, Budhathoki P, Sedhai YR, et al. Prevalence, awareness, risk factors and control of hypertension in Nepal from 2000 to 2020: A systematic review and meta-analysis. *Public Health Pract* 2021; 2: 1-14.
4. Sutlers M. Systemic hypertension. Current medical diagnosis and treatment. 50th edition. USA: McGraw Hill Lange; 2019.
5. Harrison T, Isselbacher K, Wilson J. Harrison's principles of internal medicine. 20th ed. New York: McGraw Hill; 2019.
6. James PA, Oparil S, Carter BL, et al. 2014 evidence based guideline for the management of high blood pressure in adults: report from the panel member appointed to the eight Joint national committee (JNC 8). *J Amer Med Assoc* 2014; 311: 507-20.
7. Carey RM, Muntner P, Bosworth HB, Whelton PK. Prevention and Control of Hypertension: JACC health promotion series. *J Am Coll Cardiol* 2018; 72(11): 1278-1293.
8. Schwartz C, McManus RJ. What is the evidence base for diagnosing hypertension and for subsequent blood pressure treatment targets in the prevention of cardiovascular disease? *BMC Med* 2015; 13: 256.
9. Sapkota B, Shrestha H, Khatri N, Shrestha K. Prescribing pattern of anti-hypertensive drugs and adherence to JNC VII Guideline. *Proceedings* 2019; 6, 11.
10. Roy US, Khandaker NR, Uddin S, Khan MR, Sarker NR. *J Shaheed Suhrawardy Med Coll* 2016; 8(2): 39-43.
11. Adejumo O, Okaka E, Iyawe I. Prescription pattern of antihypertensive medications and blood pressure control among hypertensive outpatients at the University of Benin Teaching Hospital in Benin City, Nigeria. *Malawi Med J* 2017; 29: 113-7.
12. Kumar A, Malhotra A, Malhotra P, Mantoo S. Prescribing patterns of antihypertensive drugs: An observational hospital based study in outpatient department of a medical college in North India. *J Med Sci Clin Res* 2020; 8: 228-36.
13. Ahmed A, Saqlain M, Tanveer M et al. Prescribing Patterns of Antihypertensive Drugs in Patients Attending Tertiary Care Hospitals in Pakistan. *SN Compr Clin Med* 2021.

14. Petrie JR, Guzik TJ, Touyz RM. Diabetes, hypertension, and cardiovascular disease: Clinical insights and vascular mechanisms. *Candiann J Cardiology*. 2018; 34: 575-84.
15. Lamsal KS, Neupane KR, Kafle S. Prescription Patterns of Antihypertensive Drugs at Tertiary Care Hospital: A Descriptive Cross Sectional Study. *J Natl Med Coll* 2020; 1:22-6
16. Arya DS , Chowdhury S, Chawla R et al. Clinical Benefits of Fixed Dose Combinations Translated to Improved Patient Compliance. *J Assoc Physicians India* 2019; 67(12):58-64.
17. Ramadas S, Sujatha MB, Andrews MA, Sanalkumar K. B. Drug utilization study of antihypertensive drugs and prevalence of blood pressure control in adult hypertensive patients based on JNC VIII guidelines in a tertiary care hospital: a cross sectional study. *Int J Basic Clin Pharmacol*. 2019; 8: 245-52.
18. Bruno CM, Amaradio MD, Pricoco G, Marino E, Bruno F (2018) Lifestyle and Hypertension: An Evidence-Based Review. *J Hypertens Manag*. 2018; 4: 030.
19. de Oliveira AC, Santos P (2018) Hypertension: Drug Adherence and Social Factors. *J Hypertens Manag*. 2018; 4:034.
20. Burnier M, Egan BM. Adherence in Hypertension: A Review of Prevalence, Risk Factors, Impact, and Management. *Circ Res*. 2019;124: 1124–40.