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Original Article

Prescription Patterns of Antihypertensive Drugs at Tertiary Care Hospital: A Descriptive Cross Sectional Study

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Abstract

Background
Hypertension is leading cause of deaths in the world. It is a modifiable and major risk factor for cardiovascular, renal and brain diseases. This study was done to see the current trend of prescription patterns of antihypertensive drugs in a tertiary care hospital in Nepal.

Materials and Methods
Observational cross sectional study was done in the patients with hypertension from September 2018 to September 2019 in the department of Medicine of Civil Service Hospital, a tertiary care hospital in Kathmandu, Nepal. A total of 242 Patients who were undergoing antihypertensive treatment were included. All calculations and statistical analyses are processed by the SPSS 25.0.

Results
Out of 242 prescriptions, 135 (55.8%) were males, and 107 (44.2%) were females. Among them, 49 (20.2%) patients had controlled Blood Pressure, 63(26%) patients had hypertension stage I and the remaining 130 patients (53.7%) patients had stage II hypertension. In the present study, 133 (54.96%) were treated with monotherapy while, 71 (29.33%) patients were prescribed with dual therapy. The most frequently prescribed drug as monotherapy was calcium channel Blocker in 71(53.3%) patients followed by angiotensin receptor blockers in 38 (28.6%) and thiazide diuretics in 21 (15.7%) patients. calcium channel blockers with Angiotensin Receptor Blockers was the most prescribed combination in 44 (62.1%) patients followed by angiotensin receptor blockers and thiazide diuretics in 19 (26.8%) patients.

Conclusion
Calcium channel blockers are the highest among the drugs that are used as monotherapy. In combination therapy, Calcium channel blockers with angiotensin receptor blocker and angiotensin receptor blockers with thiazide diuretics are the frequently prescribed drugs.

Keywords: *Antihypertensive drugs, Hypertension, Prescription*

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Introduction

Systemic hypertension is a very common health problem and is defined as elevated systolic blood pressure ≥140 mm Hg or diastolic blood pressure ≥90 mm Hg [1]. In the year 2000 hypertension was estimated to affect almost one billion patients worldwide and the prevalence is predicted to increase by approximately 60% by 2025. This indicates an increase from 26.4% in 2000 to 29.2% in 2025 worldwide [2]. Because of increasing obesity and population aging even in developing countries, the global burden of hypertension is rising further and hypertension remains the leading cause of death worldwide and one of the world's great public health problems. [3]. It is the most readily identifiable and reversible risk factor for myocardial infarction, stroke and heart failure. The rise in both systolic and diastolic blood pressures is associated with an increase in cardiovascular morbidity and mortality [3]. Decreasing systolic and diastolic hypertension 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 [4]. In the last six decades, there is tremendous development in the treatment of hypertension, which includes both drug treatment and lifestyle modification. Among different drugs available so far, use of single agent as monotherapy or different agents as combined therapy can be used to treat hypertension [4]. The choice of the drug is based on mainly efficacy, adverse effects, and costs as well. Also there are several guidelines in the use of those drugs. 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 of usage of antihypertensive drugs in Nepal. Therefore, we felt need to survey the prescription patterns of those drugs to see whether current usage trend is rational and in accordance with the current guidelines for treating hypertension [1]. The study of prescription trends might help in monitoring, evaluation and necessary modifications in treatment practices to achieve proper and cost effective medical care. This was the rationale to study the prescription patterns of antihyperten-sive medications in a tertiary care hospital in Nepal.

Materials and Methods

Ethical clearance was obtained from the Institutional Review Board of Research department of the Hospital. This cross-sectional study was undertaken to analyze the prescriptions written for the patients with hypertension who attended the OPD and medical ward of a tertiary   care hospital

from September 2018 to September 2019. Formal consent was taken from all the participants. Using $n=z^2pq/d^2$ with 10% error, sample size is calculated to be 96. (z=1.96, p=0.5, d=0.1). Altogether 242 participants were included in the study. Consecutive sampling method was used and prescriptions of hypertensive patients both inpatients and outpatients were included. Those who were diagnosed previously and taking antihypertensive medications were also defined as hypertensive, whether primary or secondary. Patient categories comprising those less than 18 years of age, critically ill hypertensive patients admitted in intensive care unit and those unwilling to give consent were excluded from the study. Their blood pressure was measured using mercury sphygmomanometer with appropriate cuff size in standard method. The blood pressure was measured two times on right upper arm in sitting position in the interval of 30 minutes. The average blood pressure was taken for the study. Hypertension was defined as systolic blood pressure ≥ 140 mmHg and/or diastolic blood pressure ≥ 90 mmHg. The diagnosis and classification of hypertension were done according to the Seventh Joint National Committee on the Detection, Elevation, and Treatment of High Blood Pressure (JNC-VII) report [1]. Thedata were analyzed using SPSS 25 software. The demographic characteristics of patients, most commonly prescribed antihypertensive drugs and over all antihypertensive drugs prescription patterns were the parameters analyzed from the data collected from these prescriptions.

Results

During the whole study period, a total of 242 prescriptions for hypertensive patients were collected. Out of them, 135 (55.08%) were males, and 107 (44.2%) were females. The age of the participants varied widely from 18 to 91 years.

Among them, 92 (38%) were newly diagnosed and 150 (62%) were already diagnosed hypertensive, whereas 49 (20.2%) patients had controlled Blood Pressure, 63 (26%) patients had hypertension stage I and the remaining 130 patients (53.7) patients had stage II hypertension as represented in Table 1.

Table 1: Blood Pressure status of the participants (N= 242)

	Frequency (%)
Controlled BP	49(20.2)
Hypertension stage I	63(26)
Hypertension stage II	130(53.7)
Total	242(100)

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Out of the 149 previously diagnosed hypertensive patients, 83 (55.7%) had hypertension for less than 5 years, 39(26.2%) had been diagnosed for the duration of 5-10 years, while the rest 27 (18.1%) patients had hypertension for more than 10 years as shown in table 2.

Table 2: Distribution of patients in terms of duration (N=149)

Duration (in years)	Frequency (%)
Less than 5 years	83(55.7)
5-10 years	39(26.2)
More than 10 years	27(18.1)
Total	149(100)

Overall 133 (54.96%) were treated with monotherapy. Similarly, 71 (29.33%) patients were prescribed with dual therapy and 15 (6.19%) patients were prescribed with triple drug combination, while utilization of four, five and six drug regimen accounted for 2.48, 0.82 & 0.41 % respectively, as indicated in Figure 1.
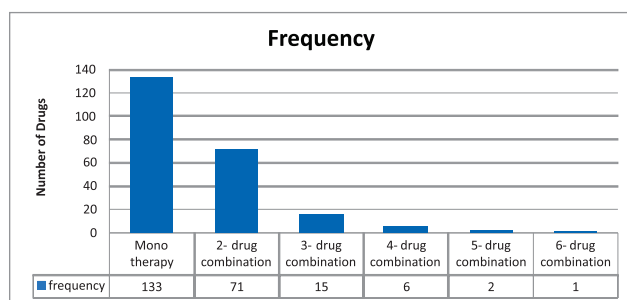

Figure 1: Prescription patterns in terms of number of drugs

Out of 133 (54.96%) treated with monotherapy, calcium channel blockers (CCB) were the most commonly prescribed drug in 71(53.3%) patients followed by angiotensin receptor blockers (ARB) in 38 (28.6%) patients and thiazide diuretics (TD) in 21 (15.7%) patients as shown in table 3. Beta Blockers (BB) and alpha blockers were the least common drugs used.

Table 3: Commonly Prescribed Anti-Hypertensive Drug as Monotherapy (N=133)

Drug categories	Frequency (%)
CCB	71(53.3)
ARB	38(28.6)
TD	21(15.7)
BB	2(1.5)
Alpha blockers	1(0.7)
Total	133(100)

Out of 71 (29.33%) patients treated with 2- drug regimen, CCB + ARB was the most prescribed combination in 44 (62.1%) patients followed by ARB +TD in 19 (26.8%) and CCB + BB in 15 (21.1%) patients as shown in table 4.

Table 4: Commonly Prescribed two Drug Combination for Hypertension(N=71)

Drug categories	Frequency (%)
CCB + BB	15(21.1)
CCB +ARB	44(62.1)
CCB + TD	2(2.8)
CCB + ACE-I	2(2.8)
BB +ARB	2(2.8)
ARB + TD	19(26.8)
TD + ACE-I	1(1.4)
Total	71(100)

In combination therapy, 3-drug combinations accounted for 15 (6.19%) of total prescriptions and the 3-drug combinations with CCB + ARB + TD was the most common in 9 (3.7%) patients followed by CCB + ARB + alpha-blockers in 3 (1.2%) patients among total.

Discussion

Prescription based analysis is very important but simple way to assess how drugs are being prescribed. The prescribing trend also generates idea whether treating physicians are adhered to the recommendations by international guidelines. The feedback from such study can be very useful to promote rational drug use. In our study, the use of antihypertensive drug classes as monotherapy in the decreasing order was CCBs (53.3%), followed by ARBs (28.6%) and Thiazide Diuretics (15.7%). Although, the JNC VII guidelines recommend thiazides as initial therapy either alone or in combination [1], this drug class was only the third most commonly prescribed in our study. Also the NICE guidelines of UK recommend ACEI or ARB ,for those under 55 years of age and a CCB to over 55 years above as initial therapy until there are compelling indications [5]. However, according to the study by James PA, Oparil S, Carter BL et al in 2014, either of thiazide type of diuretics, CCBs, ACEIs or ARBs can be considered as first line antihypertensive agent [6]. In our study, the most frequent use of CCBs may be because of their better tolerance, single daily dosing, low cost and well established antihypertensive efficacy [7]. Similarly, higher usage of ARBs may be because of their additional cardiovascular and renoprotective effects [8], as well as physicians` perceptions that ARBs have better antihyperten-sive effects.
The decreasing use ofdiuretics or BBs, which is also reflected in our study may beexplained by physician perceptions that diuretics andBBs are lesseffective, and have more adverse effects than CCB for management of hypertension. These study results are similar to the study done in India in 2014, which showed CCBs to be most prescribed monotherapy drug[9]. Similarly, in a study done by Altaf et. al in an out-patient department

of Owaisi Hospital & Research Centre in 100 patients, the most common drug classes involved in the study were CCB 37% followed by ARB 21%[10].Another study done by Sindhu et al in multi-specialtyhospital in southern Indian state showed 38(48.7%) to be treated with CCBs, followed by 22(28.2%) with ARBs as a monotherapy drug [11]. Monotherapy (54.96%) was leading trends of antihypertensive therapy followed by 2 drug combination (29.33%) and polytherapy (9.91%) in our study similar to a study done by Rachana PR et al in 300 patients in a tertiary care hospital, Bangalore: monotherapy (48.94%) followed by fixed dose combination (35.04%) and polytherapy (16.01%) [12].

The JNC VII report recommends to initiate combination therapy in stage II hypertension [1]. The rationale for combination therapy is better control rates due to increase in the efficacy of antihypertensive drugs by synergistic effects as well as decreased adverse drug reactions. Some antihypertensive agents mainly CCBs, ACEIs and diuretics increase plasma renin activity. This effect is countered if they are combined with the drugs which lower plasma renin activity, i.e. BBs and centrally acting sympatholytic drugs [4]. Potassium loosing effects of diuretics can be compensated by hyperkalemic effects of the drugs acting on renin angiotensin system. Similarly, possible tachycardia induced by dihydropyridine CCBs can be countered by combining them with BBs. Despite all, JNC VII doesn't give clear guideline as to which antihypertensive drug combination to start with. But the European Society of Hypertension and European Society of Cardiology (ESH/EHC) guidelines suggest the two drug combination as ACEI+ Thiazide diuretic, ARB+Thiazide diuretic, ACEI+ CCB, ARB+CCB, CCB+ Thiazide diuretic and dihydropyridine CCB+BB for the management of hypertension [13].The NICE clinical guidelines of the UK recommends the combination of ACEI/ARB with CCB as a second step and combination of ACEI/ARB+CCB+thiazide diuretic as the third step when the previous combinations have failed to maintain the blood pressure goals [5].

Similar to the ESH/ESC and NICE guidelines, most common two drug combination in our study were CCB + ARB in 44 (18.2%) patients followed by ARB +TD in 19 (7.9%) and CCB + BB in 15 (6.2%) patients. Similar to the NICE guidelines, themost common 3-drug combination was CCB + ARB + TD.

Limited Sample size in one study center may not reflect the prescription patterns of antihypertensive drugs in the entire population. Different causes of possible secondary hypertension were not analyzed. Different compelling indications of antihypertensive drugs were also not analyzed. Main limitation of drug prescription studies is the lack of detailed patient records.

Conclusion

Though the prescribing patterns keep on changing with time, the present study confirms that prescribing trends are rational. The study also provides the baseline data for similar studies in future. The prescribing patterns mainly depend upon the drug efficacy, patient's compliance, cost efficacy, physician's preference and changing practice patterns.

Conflicts of interests: The authors declare that they have no competing interest.

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