Assessment of prescribing, dispensing, and patient use pattern of antihypertensive drugs for patients attending outpatient department of Hiwot Fana Specialized University Hospital, Harar, Eastern Ethiopia

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Background: Hypertension is a global concern and is one of the key preventable risk factors for cardiovascular events, resulting in unnecessary morbidity and mortality. The aim of this study was to assess the prescribing, dispensing and patient use pattern of antihypertensive drugs among patients attending Hiwot Fana Specialized University Hospital outpatient department.

Methods: A hospital-based cross-sectional study was conducted in Hiwot Fana Specialized University Hospital on assessment of the prescribing, dispensing, and patient use pattern of antihypertensive drugs among patients who were above the age of 18 years and attending outpatient department from April 1–May 31, 2013. Data collection was conducted by reviewing the record of patients and direct observation of the dispensing process of randomly selected patients to measure average dispensing time, and direct interview with the patients.

Results: A total of 400 patients met the inclusion criteria; out of the 400 patients studied, 63.5% were females. Most of the patients had Stage 1 hypertension (69%), followed by Stage 2 hypertension (31%). Out of the total number of patients, 264 were with different comorbid conditions: diabetes mellitus (64.3%), followed by congestive heart failure (15.1%) and ischemic heart disease (2.3%). The most frequently prescribed class of antihypertensive drugs was diuretics, of which hydrochlorothiazide was the most frequently prescribed drug, both in single (55%), followed by enalapril (22.3%), methyl dopa (11.2%), atenolol (6.9%), and nifedipine (4.6%), and in combination with other antihypertensive drugs. The average dispensing time was 1.2 minutes, and 75% of the patients left the counter with inadequate information about the dosage.

Conclusion: All antihypertensive drugs prescribed were in compliance with the Ethiopian Standard Treatment Guidelines. This study showed that most outpatients with hypertension in our hospital received monotherapy. Diuretics and angiotensin converting enzyme inhibitors were the most frequently prescribed classes of antihypertensive drugs in both monotherapy and combination therapy.

Keywords: hypertension, antihypertensive drugs, monotherapy, combination therapy, fixed dose combination, compliance

Introduction

Background information

Hypertension is a major global concern and public health problem affecting more than one billion individuals worldwide and is one of the key preventable risk factors for
cardiovascular events. It has a massive distributing impact on
the population’s health, resulting in unnecessary morbidity
and mortality.1

In nearly 75% of adults with cardiovascular disease,
hypertension is a common morbidity.2 Despite the availability
of a wide range of antihypertensive drugs, hypertension
and its complications are still an important cause of adult
morbidity and mortality.3,4

Factors reported to be contributing to the failure to control
blood pressure (BP) include poor adherence to therapeutic
regimen, ignorance, and poverty.3,5 Recent reports have,
however, focused on the role of health care provider and
poor adherence to antihypertensive drugs.6

One of the most pressing problems facing public health
providers and administrators in many countries is the irra-
tional use of drugs,7 and, therefore, the concept of rational
drug use during the past few years has been the theme of
various national and international gatherings. Various studies
conducted in developing as well as developed countries
during the past few years regarding the safe and effective use of
drugs show that irrational drug use is a global phenomenon,
and only few prescriptions show rational use of drugs.8

The irrational use of drugs is a major problem of present-
day medical practice, and its consequences include ineffective
treatment, unnecessary prescription of drugs, development of
resistance, adverse effects, and economic burden on patients
and society. The five important criteria for rational drug use
are accurate diagnosis, proper prescribing, correct dispensing,
suitable packing, and patient adherence. Therefore, prescrib-
ers should make accurate diagnoses and prescribe rationally.
Pharmacists should ensure that the effective form of the
drug reaches the right patient in the prescribed dosage and
should also give clear instructions on the use of the drug.9,10
The study of the prescribing pattern is an important part
of a medical audit that seeks to monitor the pattern of drug use
and necessary modification to the pattern to achieve rational
and cost-effective medication use.11

The need to improve the global control of high BP neces-
sitated the stipulation of various hypertension classification
and treatment guidelines. In recent times, these guidelines
include those of the World Health Organization/International
Society of Hypertension (WHO/ISH) and the sixth and sever-
th report of the joint national committee on the prevention,
detection, evaluation, and treatment of hypertension.12

The aim of this study was, therefore, to assess the prescrib-
ing, dispensing, and patient use pattern of antihypertensive
drugs in the outpatient department of Hiwot Fana Specialized
University Hospital (HFSUH). The prescribing pattern was
investigated to ascertain whether it was in accordance with
Ethiopian Standard Treatment Guidelines.

Methodology

Prospective and retrospective studies were conducted in the
hospital after obtaining approval from the institutional ethical
committee. Permission was also obtained from the head of
the hospital to access records. Informed consent was secured
as the study involved analysis of records.

Data were collected by evaluating or reviewing the records
of 400 patients with hypertension attending HFSUH and by
directly observing the dispensing pattern to determine the
time of dispensing between the patients and the pharmacists
as well as to evaluate the pattern of patient use. Two hundred
patients randomly selected were interviewed by using
preprepared data collection tools for those who were taking
their medication from the pharmacy during April 1–May 31,
2013. The amount of time that the pharmacist spent with the
patient while dispensing the prescribed drug was measured
by directly observing the dispensing process.

All patients who had hypertension and were actively
attending the HFSUH outpatient department were included
in the study; however, patients attending the inpatient
department, who were under the age of 18, with psychiatric
illnesses, who were chronically ill-looking, and manifested
hypertensive emergencies, or were nonconsenting were
excluded from the study.

Drugs were grouped in major classes of antihypertensive
monotherapy – diuretics, beta-blockers (BB), angiotensin
converting enzyme (ACE) inhibitors and angiotensin II
receptor antagonists (AIIRAs), calcium channel blockers
(CCBs), or others. Monotherapy was defined as a prescription
for one agent, or two within the same drug class (to cover the
widely used fixed-combination formulations). Combination
therapy was defined as a prescription for more than one agent
from two classes, including two agents in one formulation.

Hypertension was defined as systolic blood pressure
≥140 mmHg and diastolic blood pressure ≥90, or being
on drug therapy. Stage 1 blood pressure was defined as BP
in the range 140–159/90–99, and Stage 2 blood pressure
as BP in the range ≥160/≥100. Prehypertension was not
considered to be a disease category.

The prescribing pattern was compared with the Ethiopian
Standard Treatment Guidelines, which suggest that any one
of the following classes of drugs could be used as first-step
agents against hypertension based on nonemergency and
emergency conditions: diuretics, beta-blockers, calcium
antagonists, and converting enzyme inhibitors, and the drugs
prescribed were also checked to ascertain whether they were on the List of Essential Medicines for Ethiopia or not.

**Results**

Among the 400 patients studied, 63.5% and 36.5% were females and males, respectively. Most of them fell in the age group of 51–60 years. The majority of the patients (69%) had Stage 1 hypertension, and 31% had Stage 2 hypertension (as shown in Table 1). Out of the total number of patients, 132 had comorbid conditions, and 85 were on monotherapy, namely, diabetes mellitus (64.3%), followed by congestive heart failure (CHF) (15.1%), and ischemic heart disease (ISHD) (2.3%). The remaining 18.3% had other infectious diseases as comorbid conditions.

The highest number of prescriptions were ordered by health officers (212; 53%), followed by prescriptions ordered by nurses (110; 27.5%), medical doctors (40; 10%), and medical and HO interns (38; 9.5%), as indicated in Figure 1.

Of the 400 patients studied, 260 (65.5%) were on monotherapy, while 140 (34.5%) were on combination therapy. Sex-wise, 163 females received monotherapy, and 49 males were on combination therapy. The pattern of prescription of antihypertensive drugs is shown in Table 2. The most frequently prescribed class of antihypertensive drugs was diuretics, of which hydrochlorothiazide (HCT) was the most frequently prescribed drug, both in single (55%), followed by enalapril (22.3%), methyl dopa (11.2%), atenolol (6.9%), and nifedipine (4.6%), and in combination with other antihypertensive drugs.

A two-drug combination appeared to be the most frequent dose regimen, of which the HCT–Enalapril combination comprised more than half (57%). Twenty-seven and half percent and 72.5% of the two-drug combination regimen were prescribed in Stage 1 hypertension and Stage 2 hypertension, respectively.

A total of 1,280 drugs were prescribed, and the average number of drugs prescribed per encounter was 3.2±0.93. Out of 544 antihypertensive drugs prescribed, 527 (97%) were prescribed in accordance with Ethiopian Standard Treatment Guidelines, and 473 (87%) were prescribed by their generic name. All antihypertensive drugs were prescribed from the list of essential medicines.

The average dispensing time for each patient was 1.5 minutes. Out of 200 patients who were interviewed after dispensing, only 13 (6.5%), 52 (26%), 58 (36%), 11 (5.5%), and 26 (13%) knew the names of the drug, dose of the drug, frequency of dosing, side effects of the drugs they were taking, and caution to take during the treatment regimen, respectively.

**Discussion**

The results of the present study indicate that the proportion of females with hypertension (63.5%) was high. Other studies have also revealed that there was a high incidence of hypertension among females. More than half of the patients were over 51 years old, showing that higher age was directly related to a higher incidence of hypertension. Among the various possibilities, this could be attributable to the lack of awareness of hypertension and the lack of control of hypertension in old age.

A study conducted by Shivashankaramurthy et al in India revealed that 80% had hypertension (HPN) with edema, unlike our study, which indicated that most of the patients had HPN with diabetes mellitus as the prevalent comorbid illnesses.

This study showed that most outpatients with hypertension in the hospital received monotherapy, although international guidelines indicated that monotherapy achieves the BP target only in a limited number of hypertensive patients. Earlier studies suggested that an ideal combination therapy must include antihypertensive drugs possessing complementary modes of action that produce synergistic antihypertensive effects without any adverse effects, at low

**Table 1** Demographic characteristics of hypertensive patients on antihypertensive drugs in HFSUH outpatient department, April 1–May 31, 2013

<table>
<thead>
<tr>
<th>Age (years)</th>
<th>Sex</th>
<th>Total (males + females)</th>
<th>Percentage of hypertensive patients (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>18–30</td>
<td>5</td>
<td>23</td>
<td>7</td>
</tr>
<tr>
<td>31–40</td>
<td>15</td>
<td>39</td>
<td>13.5</td>
</tr>
<tr>
<td>41–50</td>
<td>28</td>
<td>80</td>
<td>27</td>
</tr>
<tr>
<td>51–60</td>
<td>57</td>
<td>67</td>
<td>31</td>
</tr>
<tr>
<td>&gt;60</td>
<td>41</td>
<td>45</td>
<td>21.5</td>
</tr>
<tr>
<td>Total</td>
<td>146</td>
<td>254</td>
<td>100</td>
</tr>
</tbody>
</table>

Abbreviation: HFSUH, Hiwot Fana Specialized University Hospital.
### Table 2 Combination antihypertensive therapy for hypertensive patients in HFSUH outpatient department, April 1–May 31, 2013

<table>
<thead>
<tr>
<th>Combination type</th>
<th>Class of drugs</th>
<th>Specific drugs</th>
<th>Patients on combination therapy, number (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Two-drug combination</td>
<td>Diuretics + ACE inhibitor</td>
<td>HCT + Enalapril</td>
<td>81 (57)</td>
</tr>
<tr>
<td></td>
<td>Diuretics + CCB</td>
<td>HCT + Nifedipine</td>
<td>35 (26.1)</td>
</tr>
<tr>
<td></td>
<td>Diuretics + Central alpha agonist</td>
<td>HCT + Methyl dopa</td>
<td>20 (14.5)</td>
</tr>
<tr>
<td>Three-drug combination</td>
<td>Diuretics + ACE inhibitor + CCB</td>
<td>HCT + Enalapril + Nifedipine</td>
<td>4 (1.4)</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td>140 (100)</td>
</tr>
</tbody>
</table>

**Abbreviations:** ACE, angiotensin converting enzyme; CCB, calcium channel blockers; HCT, hydrochlorothiazide; HFSUH, Hiwot Fana Specialized University Hospital.

A study conducted by Beg et al\textsuperscript{15} revealed that the proportion of patients on combination therapy was higher than that of those monotherapy.

The choice of diuretics as the first-line antihypertensive drug in our setting was consistent with other studies done by Etuk et al\textsuperscript{16} and in compliance with the current Ethiopian Standard Treatment Guidelines.\textsuperscript{17,18} Another study conducted by Khurshid et al\textsuperscript{19} in India also reported that diuretics were the most frequently prescribed antihypertensive drugs, a finding similar to our own. The JNC 7 report recommends that in the absence of any specific indications, a diuretic or β-blocker should be selected as the initial therapy for hypertension.\textsuperscript{20} A thiazide diuretic should be prescribed in the absence of an indication for any other specific drug(s) or when target BP has not been attained.\textsuperscript{21} However, Khaja et al\textsuperscript{22} reported that BB (65.5%) were the most frequently prescribed and that diuretics (27.4%) ranked second with respect to overall utilization pattern. Diuretic and BB monotherapy accounted for almost 55% of first-line treatment in the study done by Walley et al\textsuperscript{23} in the UK.

From the combination therapy, our study showed Diuretics + ACE Inhibitor (57%) and Diuretics + CCB (26.1%) were the most frequently prescribed classes of antihypertensive drugs; however, the study done by Shivashankaramurthy et al\textsuperscript{14} showed CCB + BB (43.9%) was frequently prescribed, followed by AIIRAs and diuretics (22.94%). Beg et al\textsuperscript{15} reported that most commonly prescribed antihypertensive agents were AIIRAs and ACE inhibitors. In the study by Odili et al\textsuperscript{12}, almost half of the subjects (49%) were on a two-drug combination regimen, and 14% were on monotherapy; CCB were the most frequently prescribed classes of drugs (31%), followed by diuretics (30%). In the same study,\textsuperscript{24} diuretics were the commonest in combination regimen (74%). It is reported that a BB diuretic combination is diabetogenic and should be avoided, especially in obese individuals and those with a family history of diabetes mellitus,\textsuperscript{21} but there was a practice of prescribing such a combination therapy for patients with diabetes mellitus in our setting.

It was observed in our study that there was a low frequency of prescription administration of BB and CCB as monotherapy. Furthermore, none of the patients was on AIIRAs either in monotherapy or in combination therapy. The results of our study also showed that there was high prevalence of Stage 1 hypertension (69%).

It was found that the number of drugs prescribed increased with severity of disease and with different comorbid conditions. The study also showed that the average number of drugs prescribed per encounter was 3.2±0.923. Around half of the patients (53%) had received their medications upon the orders of Health Officers, and the least were ordered by Medical and Health Officer Interns. Out of 544 antihypertensive drugs prescribed, 527 (97%) were prescribed in accordance with Ethiopian Standard Treatment Guidelines, and 473 (87%) were prescribed by their generic name. The use of generic names could decrease the financial burden on the patient, and this could show there was a rational prescribing pattern in the setting. Another study done by Beg et al\textsuperscript{15} revealed that the average number of drugs per prescription was 2.83. The average time spent between patient and pharmacist during dispensing was 1.23 minutes in our study.

According to our study, greater than 75% of the patients left the counter without knowing the names of the drugs, side effects, and precautions associated with their medications. This may be because the pharmacists did not take the time to tell the patients about the drug while dispensing. It may also be because most of the patients came from rural areas and were illiterate, so that could have made it difficult for them to read and understand the drugs they were treated with.

**Conclusion**

All antihypertensive drugs prescribed were consistent with the Ethiopian treatment guidelines for hypertension. This study also showed that most outpatients with hypertension in our hospital received monotherapy. Diuretics and ACE inhibitors were the most frequently prescribed drugs in both monotherapy and combination therapy. The highest number...
of prescriptions were ordered by Health Officers, and the fewest were by medical and HO interns. Most patients left the counter with inadequate information about the dosage regimen.

Acknowledgments
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Disclosure
The authors report no conflicts of interest in this work.

References