Hailu Abera, Mihret Woldemichael. *Ethiop Med J, 2016, Vol. 54, No. 2*

ORIGINAL ARTICLE

PATTERN OF ANTIHYPERTENSIVE THERAPY AMONG DIABETIC HYPERTENSIVE PATIENTS IN ZEWDITU MEMORIAL HOSPITAL, ADDIS ABABA

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ABSTRACT

Introduction: *Diabetes mellitus is becoming a common chronic disease in both developed and developing nations and is associated with significant cardiovascular disease morbidity and mortality. The presence of hypertension in patients with diabetes mellitus doubles the risk of cardiovascular disease including coronary heart disease, congestive heart failure, ischemic and hemorrhagic stroke, renal failure and peripheral arterial disease.*

Objective*: The aim of this study was to assess the pattern of antihypertensive drug therapy among diabetic-hypertensive patients in Zewditu Memorial Hospital Diabetic Clinic in Addis Ababa.*

Methods*: This is a hospital based retrospective review of medical records of 382 diabetic-hypertensive patients who visited the Zewditu Memorial Hospital Diabetic Clinic in the period between August 2014 and January 2015.*

Results*: The most frequently prescribed antihypertensive drug classes were angiotensin converting enzyme inhibitor in 321 (84%) followed by calcium channel blocker in 229 (60%) and beta blocker in 145 (38%) patients. Enalapril, nifedipine, atenolol, losartan and hydrochlorthiazide were the only angiotensin converting enzyme inhibitor, calcium channel blocker, beta blocker, angiotensin receptor blocker and diuretic prescribed, respectively. Enalapril was used as a monotherapy in 73 (19%) and nifedipine in 26 (7%) patients. The recommended target systolic blood pressure <140 mmHg and diastolic blood pressure <90mmHg was achieved in only 57 (15%) patients while the remaining 325 (85%) did not attain the target blood pressure. Renal function was assessed in 351 (92%) patients, of whom 23 (6%) had renal impairment with an estimated glomerular filtrate rate < 60 ml/min.*

Conclusion*: The pattern of antihypertensive drug therapy in our patients was consistent with the current treatment guidelines. However, the majority of diabetic-hypertensive patients did not reach target blood pressure.*

Key words*: Blood Pressure, Cardiovascular diseases, chronic kidney disease, diabetes mellitus, hypertension*

INTRODUCTION

Diabetes mellitus (DM) is a non-communicable disease affecting some 382 million people worldwide (1). Currently, an estimated 19.8 million adults in Africa have DM with a regional prevalence of 4.9 %. Based on the International Diabetes Federation (IDF) report, the current estimate of people living with diabetes in Ethiopia is 1.9 million (2).

DM is characterized by hyperglycemia with a fasting blood glucose of 126 mg/dl or more. It can lead to a serious disabling and life threatening metabolic, cardiovascular and renal complications (2). On the other hand, hypertension (HTN) is defined as a systolic blood pressure (SBP) of at least 140 mmHg or diastolic blood pressure (DBP) of at least 90 mmHg. It has been identified as a major risk factor not only for the development of diabetes but also for the development of microvascular and macrovascular complications such as peripheral neuropathy, nephropathy, coronary artery disease and stroke in patients with diabetes (1, 2).

Blood pressure control is found to be more effective than glycemic control in reducing risk for cardiovascular and microvascular events and for this reason management of hypertension among patients with diabetes mellitus should be prioritized and is cost effective (3).

In Ethiopia, the pattern of antihypertensive drug therapy among diabetic hypertensive patients and whether it is consistent with the current evidence-based guidelines is not so far studied. Since the inappropriate use of antihypertensive drugs has serious health and economic consequences for individuals, the community and for the success of the national health care system, it was reasonable to evaluate the antihypertensive drug prescription pattern in our setting.

MATERIALS AND METHODS

We used a retrospective cross-sectional study design to review the medical records of all diabetic hypertensive patients who were seen at the Zewditu Memorial Hospital Diabetic Clinic from August 2014 to January 2015.

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A total of 397 diabetic hypertensive patients visited the follow-up clinic during the study period. The medical records of 382 of these patients could be retrieved from the records office and all of them were reviewed using a structured questionnaire. An average of two recent blood pressure measurements and the most recent fasting blood glucose was used for analysis. Glomerular filtration rate (GFR) was calculated based on the Modification of Diet in Renal Disease (MDRD) equation using a software application. The medical records of patients were used to obtain demographic information, diagnostic information, vital signs, laboratory test results and prescribed drugs.

All data from the questionnaires were then exported and analyzed using Statistical Software for Social Sciences (SPSS) version 20.0. Errors related to inconsistency of data were corrected during data clearing. Univariate analysis employing frequency distributions in percentages, measures of central tendency and dispersion of the distributions of variables, and appropriate graphic presentations were used to describe the data. The chi-square statistic was used to test for significance where appropriate and a p-value of <0.05 was considered statistically significant. Ethical clearance was obtained from the Addis Ababa Health Bureau Ethical Clearance Committee and subsequently the Health Bureau had written an official letter to Zewditu Memorial Hospital.

RESULTS

During the study period, medical registries of 720 diabetic patients were identified out of which 397 (55.1%) were diabetic and hypertensive; however, medical records of only 382 (96.2%) patients were found and all of these were included in the analysis.

Two hundred twenty nine (59.9%) patients were males and the male to female ratio was 1.5:1. The mean age (+/- SD) of the study patients was 56.3 (+/- 10) years. The majority of patients (69%) lay in the age range of 46-65 years, followed by the 31-45 year old range (Figure 1).

Three-hundred sixty seven patients (96%) had type 2 DM and the mean duration of DM and HTN were 6.2 and 6.4 years, respectively. The recommended target SBP<140 mmHg and DBP<90 mmHg was achieved in only 57 (15%) patients while in the remaining 325 patients (85%) the target was not attained. Out of 351 patients (92%) whose renal function was assessed, twenty three (6%) had renal impairment with an estimated glomerular filtration rate (GFR)<60ml/min (Table 1).

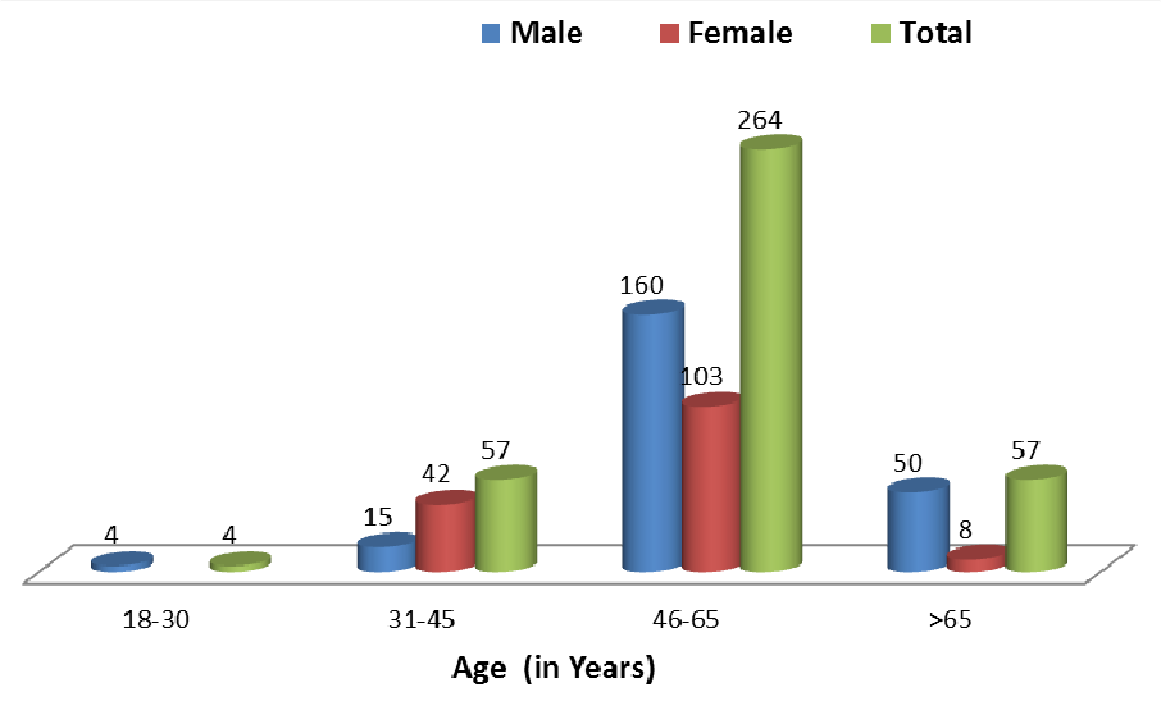

Figure 1: Age distribution of patients with diabetes mellitus and hypertension, Zewditu Memorial Hospital, Addis Ababa, 2014 (n = 382).

Table 1: Characteristics of patients with diabetes mellitus and hypertension, Zewditu Memorial Hospital Addis Ababa, 2014 (*n* = 382)

Parameter	Value
Type of diabetes mellitus	
Type 1	15 (4%)
Type 2	367 (96%)
Duration diabetes mellitus (mean in years)	6.2 (range 1.0-17.0)
Fasting blood glucose (mean±SD mg/dl)	160.2±59.2
Type of anti-diabetic treatment	
Oral hypoglycemic agent	206 (54%)
Insulin	157 (41%)
Both	19 (5%)
Duration of hypertension (mean in years)	6.4 (range 1.0-20.0)
Blood pressure goal for diabetes mellitus	
<140 mmHg and < 90 mmHg	57 (15%)
≥140 mmHg or ≥90 mmHg	325 (85%)
Globular filtration rate estimation (ml/min)	
≥60	329 (86%)
<60	23 (6%)
Renal function not determined	30 (8%)

The mean number (+/-SD) of antihypertensive medications prescribed per patient was 1.95 (+/- 0.9). Monotherapy was prescribed for 99 (26%) and combination anti-hypertensive for 283 (74%) patients (Figure 2). The most frequently prescribed antihypertensive monotherapy was the angiotensin converting enzyme inhibitor (ACEI) class, used to treat 73 (19%) of the patients.

Among the combination of ten different antihypertensive regimens used, the most frequently prescribed combinations were ACEI plus calcium channel blocker (CCB), and ACEI plus beta blocker (BB) in 122 (32%) and 50 (13%) patients, respectively. Enalapril, nifedipine, atenolol, losartan and hydrochlorthiazide were the only ACEI, CCB, BB, angiotensin receptor blocker (ARB) and diuretic (DI) prescribed antihypertensive drugs, respectively.

Patients on monotherapy tended to have better blood pressure control than patients on combination therapy (26.9 % versus 10.8%, respectively) although this difference was not statistically significant (p=0.6). Furthermore, there were no significant differences in the overall utilization of antihypertensive drug classes among patients with controlled or uncontrolled blood pressure (Table 2).

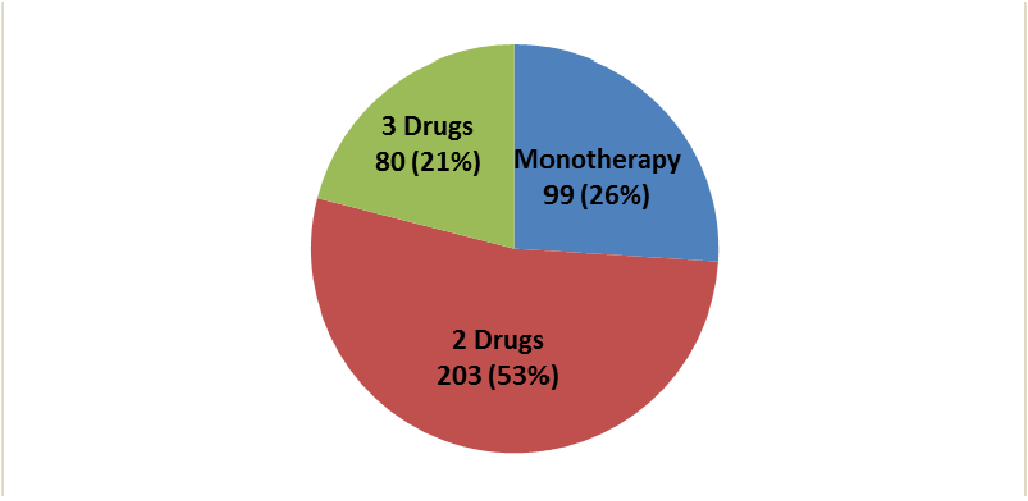

Figure 2: Number of antihypertensive medications used in patients with diabetes mellitus and hypertension, Zewditu Memorial Hospital, Addis Ababa, 2014 (n = 382).

Table 2: Prescription pattern of antihypertensive drugs in patients with controlled versus uncontrolled hypertension Zewditu Memorial Hospital, Addis Ababa, 2014 (n = 382)

Drug Class (%)		Overall Number (%)	Controlled BP Number (%)	Uncontrolled BP Number (%)
Monotherapy	Calcium Channel Blocker	26 (7)	7(2)	19(5)
	Angiotensin converting enzyme inhibitor	73 (19)	19(5)	54(14)
	Subtotal	99 (26)	26 (7)	73 (19)
2 drugs		122 (32)	11 (3)	111 (29)
	Angiotensin converting enzyme inhibitor *plus* Calcium Channel Blocker	4 (1)	-	4 (1)
	Angiotensin converting enzyme inhibitor *plus* diuretic	19 (5)	-	19 (5)
	Beta-blocker *plus* Calcium channel blocker	4 (1)	-	4 (1)
	Beta-blocker *plus* diuretic	4 (1)	-	4 (1)
	Calcium channel blocker *plus* diuretic	50 (13)	8 (2)	42 (11)
	Angiotensin converting enzyme inhibitor plus beta-blocker	203 (53)	19 (5)	184 (48)
	Subtotal			
3 Drugs	Angiotensin converting enzyme inhibitor *plus* beta-blocker *plus* Calcium channel blocker	43 (11)	7 (2)	36 (9)
	Angiotensin converting enzyme inhibitor *plus* beta-blocker *plus* diuretic	23 (6)	4 (1)	19 (5)
	Angiotensin converting enzyme inhibitor *plus* Calcium channel blocker *plus* diuretic	7 (2)	-	7 (2)
	Angiotensin II receptor blocker *plus* beta-blocker *plus* Calcium channel blocker	7 (2)	-	7 (2)
	Subtotal	80 (21)	11(3)	69 (18)

DISCUSSION

The choice of antihypertensive drug should be determined by the drug's capacity to lower blood pressure, protect the diabetic patient's kidneys from ongoing injury and reduction of cardiovascular complications. ACEI have shown a reduced incidence of cardiovascular events compared to diuretics and CCB (4,5). In our study, an ACEI was the most commonly prescribed drug (84%), followed by a CCB (60%) and a BB (38%) irrespective of mono or combination therapy. The majority of our patients (74%) were on combination therapy and the most frequently prescribed therapy was an ACEI plus a CCB (32%).

In a similar study conducted in India, the most frequently prescribed monotherapy were ACEI (59%), CCB (29%) and DI (27%) classes. But ARBs (97%) were utilized more frequently than ACEIs (78%) among patients on combination therapy (6). Our findings indicate that medication use was mostly consistent with evidence-based guidelines (7,8). However, due to the unavailability of ARBs in the hospital, their use was not widely seen in our study.

Several large clinical trials demonstrated that most patients with hypertension could achieve adequate and sustained blood pressure control only with the use of multiple anti-hypertensive drugs (9). The majority of our treated patients (74%) were on multi-drug regimens. However, only one-sixth of patients (15%) reached target blood pressure below 140/90 mmHg. Although there were no similar studies done in Ethiopia, the results of this study were similar with the findings of published studies in other countries (10,11). These studies also found that only 12-35% of patients had controlled blood pressure depending on various data sources (9, 10,12).

Further studies are warranted to define the reasons why, despite combination therapy, the majority of our patients did not attain target blood pressure. This might be due to a less optimized dosing titration, poor compliance and/or lack of motivation. Moreover, physicians often fail to educate their patients about the nature of the disease and the need for tight blood pressure control (13,14).

Both ACEI and ARB classes have been confirmed to confer additional vascular and reno-protective effects. Therefore, either should be included in the regimen, especially for those with diabetic kidney disease (6,11,15,16).

In our study, although kidney disease was confirmed in 23 (6%) patients, an ACEI was used in only 11 (3%) patients. However in a similar study in India, 100% of patients with renal disease were on either an ACEI or an ARB (6). The reason why an ACEI or an ARB was not used for patients who could have benefited was not examined but needs further study.

***Limitation of the study*:** Diabetes patients who visited a public referral hospital were involved in our study. These may differ in characteristics from patients seen at primary clinics or private health facilities in our setting. Therefore, the results are not necessarily generalizable to all patients with diabetes and hypertension .

Conclusion and Recommendation: In this study the prescription pattern of antihypertensive medications was consistent with the current treatment guidelines. However, the majority of patients with diabetes did not reach target blood pressure control. Therefore, more strict blood pressure control is needed to reduce severe complications of diabetes and hypertension. Moreover, in patients with renal impairment the use of ACEI or ARB should be initiated more frequently.

ACKNOWLEDGMENT

We are very grateful for the support and motivation by the medical director of Zewditu Memorial Hospital and our friends.

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