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Prescribing Patterns and Cost of Antihypertensive Drugs in Private Hospitals in Dar es Salaam, Tanzania.

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Antihypertensive agents are used to prevent morbidity and mortality related to hypertension. Prescribing patterns and the cost of some antihypertensive were studied for 600 patients attending medical clinics in four private hospitals in Dar es Salaam using the WHO drug use indicator forms. The average number of drugs per prescription ranged from 1.9 to 4.2 while that of antihypertensives varied from 1.3 to 2.1. About 50 % of the prescriptions contained 2 to 3 drugs. The most frequently prescribed antihypertensives were diuretics (41 %), β-blockers (28.5 %), calcium channel blockers (19.8 %), hydralazine/losartan (18.5 %) and angiotensin converting enzyme inhibitors (11.5 %). Antihypertensives prescribed as monotherapy included atenolol (23.2 %), bendrofluazide (22 %), frusemide (19 %), hydralazine (11.2 %), nifedipine (9.8 %), amlodipine (9.5 %) and enalapril (9.3 %). Among the combination therapy drugs were angiotensin converting enzyme inhibitor+diuretic (7 %), β-blocker+diuretic (4 %), calcium channel blocker+losartan (2.3 %), β-blocker+angiotensin converting enzyme inhibitor (2.2 %), calcium channel blocker+angiotensin converting enzyme inhibitor (1.8 %) and diuretic+hydralazine (1.7 %). The cost of nifedipine, bendrofluazide and frusemide was about five to six times higher in the private hospitals than at the government owned medical stores department. This study reveals a need for continuing education and standard treatment guidelines for rational prescribing of antihypertensive drugs.

Key words: Hypertension, prescribing patterns, private hospitals, cost-analysis.

INTRODUCTION

The primary goal of antihypertensive therapy is to prevent morbidity and mortality associated with hypertension. Most patients with hypertension require two or more antihypertensive medications. Thiazide diuretics, β-blockers, angiotensin converting enzyme inhibitors (ACEIs), angiotensin receptor blockers and calcium channel blockers have all been shown to reduce complications of hypertension and may be used for initial drug therapy [1-5]. In 2002, a clinical trial comparing different classes of antihypertensive medications for initial therapy found that chlorthalidone, a thiazide diuretic, was as effective as other agents in reducing coronary heart disease, death and non fatal myocardial infarction. The drug was superior to amlodipine in preventing heart failure and to lisinopril in preventing stroke [6]. Selection of antihypertensive agents should therefore be based primarily on the comparative ability to prevent these complications.

The presence of concomitant disease also influences selection of antihypertensive drugs because two diseases may be treated with a single drug. For example ACEIs are particularly useful in hypertensive patients with evidence of chronic kidney disease, β-blockers and calcium channel blockers in those who also have angina, while diuretics, ACEIs, angiotensin receptor

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blockers and β-blockers are useful in those suffering from heart failure. The α-blockers are recommended in hypertensive men who have benign prostate hypertrophy [7]. If a single drug does not adequately control blood pressure, drugs with different modes of action can be combined to effectively lower blood pressure while minimizing toxicity (stepped care).

Rational drug prescribing is defined as the use of the least number of drugs to obtain the best possible effect in the shortest period and at a reasonable cost [8]. Measurement of drug use in health facilities not only describes drug use patterns and the behavior of prescribers but also the extent of polypharmacy and the problems associated with it.

The study was aimed at identifying the patient parameters, associated co-morbid conditions and the prescribing pattern of antihypertensive agents in outpatient clinics in four private hospitals in Dar es Salaam.

MATERIALS AND METHODS

The WHO drug use indicator forms [9] were used to collect data from four private hospitals randomly selected from a total of 20 private hospitals. The selected hospitals were Aga Khan, Tanzania Maternity Services (TMS), Massana and Hindu Mandal. From each hospital 150 prescriptions were randomly reviewed as the patients came out of the clinic. For each prescription the number of drugs, the class and combinations of antihypertensives, the names of generics, number of injectable drugs and cost as well as adherence to prescription according to the National Essential Medicine List of Tanzania (NEMLIT) were analysed. The prices of the drugs were obtained from the respective hospital pharmacies and were compared to government medical store prices [10].

RESULTS AND DISCUSSION

The average number of drugs per prescription was found to be 2.9 in this study. This was in agreement with findings of an earlier study by Nsimba *et al.* [11] but higher than those reported

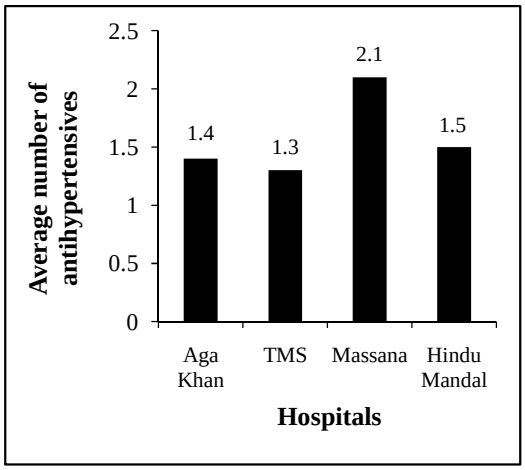

Figure 1. Average number of antihypertensives (n = 600)

by Massele and Nsimba [12]. The average number of antihypertensives per prescription was 1.6. This may be attributed to adherence of most prescribers to the antihypertensive prescribing guidelines which recommend a thiazide diuretic and β-blocker as the initial therapy. The hospital found to have the highest average number of drugs per prescription also had the highest average number of antihypertensives per prescription.

The USA Joint National Committee on the prevention, detection, evaluation and treatment of high blood pressure states that in the absence of compelling or specific indications for another drug, a diuretic or β-blocker should be chosen as initial therapy for hypertension [13]. These recommendations were seconded by the British Hypertension Society [14].

Antihypertensive monotherapy accounted for 22.7 % of all prescriptions as illustrated in table 1. The prescription of more than 5 drugs for one patient may be attributed to the possibility of some patients presenting with multiple disease conditions, the failure of doctors to select a single efficacious drug or aggressive marketing of drugs by pharmaceutical companies. Generally, a high incidence of polypharmacy was observed in this study.

Table 1. Number of drugs per prescription

Number of Drugs per Prescription	Number of Prescriptions (%)
1	136 (22.7)
2	170 (28.3)
3	148 (24.7)
4	71 (11.8)
5	33 (5.5)
6	19 (3.2)
>6	23 (3.8)
Total	**600 (100)**

Table 2 is a breakdown of the classes of anithypertensives prescribed in the study. Diuretics accounted for 41.0 % of the drugs prescribed in this study which is higher compared to a figure of 13.2 % reported in India [15], 24 % in Hong Kong [16] and 26.5 % in Bangalore [17]. Thiazide diuretics were more frequently prescribed compared to loop diuretics. The incidence of use of β-blockers observed in this study (28.5 %) was lower than that reported in India [15] and Hong Kong [16,] but higher than that reported in Bangalore [17].

The ACEIs and CCBs together made up 31.3 % of drugs prescribed. This was low compared to reports from a study in India [15]. These drugs are indicated for patients in whom the use of diuretics or β-blockers is contraindicated including patients with Type 2 diabetes mellitus, heart failure, coronary artery disease, bronchial asthma and gout. The use of ACEIs and CCBs is in keeping with the trend of their increasing use in developing and developed countries. Only about 1.5 % of drugs were prescribed as fixed drug combinations compared to 9 % in a study done in India [15].

Prescribing by generic names reduces the cost of treatment and should be encouraged. The overall generic prescribing was higher than in a previous study conducted in Dar es Salaam [12].

Table 3 shows the various drug combinations used in the treatment of hypertensive patients in this study. Although thiazide diuretics are preferred over loop diuretics for hypertension, frusemide was used for congestive heart failure

Table 2. Drugs prescribed for essential hypertension by class.

Drug	Number of Prescriptions (%)
β-blockers	**171 (28.5)**
Atenolol	139 (23.2)
Metoprolol	1(0.2)
Propranolol	29 (4.8)
Carvedilol	2 (0.3)
CCBs	**119 (19.8)**
Amlodipine	57 (9.5)
Nifedipine	59 (9.8)
Verapamil	1 (0.2)
Felodipine	2 (0.3)
ACEIs	**69 (11.5)**
Enalapril	56 (9.3)
Lisinopril	13 (2.2)
Diuretics	**246 (41.0)**
Furosemide	113 (18.8)
Bendroflumethiazide	132 (22.0)
Spironolactone	1 (0.2)
Hydralazine	67 (11.2)
Losartan	44 (7.3)
Others	111 (18.5)
Fixed-dose combination	**9 (1.5)**
Brinerdine® (Dihydroergocristine, Clopamide, reserpine)	7 (1.2)
Moduretic® (amiloride, hydroclorthiazide)	2 (0.3)

CCB = calcium channel blocker, ACEI = angiotensin converting enzyme inhibitor

to the same extent as the thiazide diuretics. The prescription of two or three diuretics plus one other antihypertensive like bendrofluazide, frusemide and spironolactone or bendroflumethiazide, frusemide and β-blocker or ACEI as observed in this study is not rational and should be discouraged.

Less than 10 % of all drugs were prescribed according to the NEMLIT. This was very low compared to 60.33% in India [15]. This may be due to the inavailability of the NEMLIT, treatment guidelines or the Tanzanian National

Table 3. Drugs combinations used in treatment of hypertension.

Drug Combinations	Prescription count (%)
2 drug combinations	**170 (28.3)**
β-blocker/ACEI	17 (9.0)
β-blocker/CCB	9 (4.8)
β-blocker/Diuretic	26 (16.6)
β-blocker/Losartan	6 (2.8)
β-blocker/Hydralazine	8 (4.1)
CCB/ACEI	13 (7.6)
CCB/Losartan	16 (9.4)
CCB/Hydralazine	4 (2.4)
ACEI/Diuretic	42 (24.7)
ACEI/Hydralazine	3 (1.8)
Diuretic/Losartan	11 (6.5)
Loop/thiazide/K-SD	11 (6.5)
3 drug combinations	**148 (24.7)**
β-blocker/2 diuretics	4 (2.7)
ACEI/2 diuretics	4 (2.7)
Diuretics/ACEI/K-SD	8 (5.4)
Losartan/CCB/β-blocker	4 (2.7)
Losartan/Diuretic/CCB	14 (9.5)
Losartan/Diuretic/β-blocker	8 (5.4)
Hydralazine/Diuretic/CCB	8 (5.4)
Hydralazine/Diuretic/ACEI	8 (5.4)
Hydralazine/β-blocker/CCB	25 (16.9)
Hydralazine/β-blocker/ACEI	12 (8.1)
Hydralazine/Diuretic/β-blocker	12 (8.1)
β-blocker/Diuretic/CCB	25 (16.9)
β-blocker/Diuretic/ACEI	14 (9.5)
β-blocker/ACEI/CCB	8 (5.4)
Losartan/Diuretic/K-SD	4 (2.7)
4 drug combinations	**71 (11.8)**
Hydralazine/Diuretic/ACEI/β-blocker	21 (29.6)
Hydralazine/2 diuretics/ACEI	6 (8.5)
Hydralazine/CCB/ACEI/β-blocker	10 (14.1)
Hydralazine/CCB/Diuretic/β-blocker	10 (14.1)
Hydralazine/Diuretic/ACEI/CCB	6 (8.5)
Losartan/Diuretic/K-SD/CCB	6 (8.5)
Brinerdine/Hydralazine	6 (8.5)
Brinerdine/CCB	6 (8.5)
5 drug combinations	**33 (5.5)**
Hydralazine/CCB/2 diuretics/β-blocker	33 (5.5)
≥6 drug combinations	**42 (7.0)**

CCB = calcium channel blocker, ACEI = angiotensin converting enzyme inhibitor, K-SD = potassium sparing diuretic

Formulary in the hospitals. The prices of MSD drugs were generally lower compared to those of drugs available in the four hospitals. Nifedipine and bendrofluazide tablets were approximately five six times more expensive, respectively, in the private hospitals as compared to the MSD.

CONCLUSION

In this study, it was found that most hypertensive patients were treated with two drugs. In certain cases more than three antihypertensive drugs were prescribed. β-blockers and diuretics were the most frequently prescribed drugs. The CCBs and ACEIs were prescribed for a number of patients possibly due to concurrent diseases. Newer and more expensive drugs such as losartan, carvedilol and the combination of amlodipine and a thiazide diuretic were prescribed for a significant number of patients thus increasing the cost of treatment. It is recommended that regular continuing educations should be provided to prescribers on rational use of drugs in hypertension and co-morbid conditions.

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Table 4. Prices of selected antihypertensives at the MSD and private hospitals

Drug	MSD	Aga Khan	TMS	Massana	Hindu Mandal
Atenolol (50mg)	50.0	80.0	80.0	50.0	50.0
Bendroflumethiazide (5mg)	6.1	40.0	30.0	25.0	40.0
Nifedipine (20mg)	20.0	100.0	100.0	90.0	100.0
Furosemide (40mg)	3.3	30.0	20.0	20.0	15.0

Prices in Tanzanian shillings.

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