

Antihypertensive Drug Utilization and Blood Pressure Control in a Nigerian Hypertensive Population

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Abstract

This research work aimed at investigating the management of hypertension from statistics documented in the hospital records. Data was sourced from patients' case notes and from these records, information obtained include blood pressure readings, drugs used, comorbidities, length of treatment; these parameters were used in evaluating the prescription pattern in the management of hypertension and the recent rate of blood pressure control in the hypertensive patients as indices of the current management of hypertension. The underlying hypothesis for the work is that a longer period of evaluation should be a better metric in the evaluation of pattern of antihypertensive drug use and overall assessment of blood pressure control. The data obtained was analyzed statistically and the result revealed that the overall level of blood pressure control for the 279 patients' records reviewed was 20.4%. The study revealed that the current rate of blood pressure control was low among this population.

Keywords: Antihypertensive drug utilization; Blood pressure control; Nigerian population

Abbreviations:

ACEI: Angiotensin Converting Enzyme Inhibitors; ARB: Angiotensin Receptor Blockers; BB: Beta-Blockers; CAD: Centrally-Acting Drugs (α -Methyldopa); CCB: Calcium Channel Blockers; D: Diuretics

Introduction

In a recent study, cardiovascular diseases especially hypertension increased by 150% compared with previous report from similar setting. Hypertension and hypertension related diseases proved to be the most frequent cause of hospital admissions and stroke was the leading cause of death, (20%) [1]. Hypertension is one of the most important causes of premature death worldwide currently affecting one in three adults worldwide; in 2025, an estimated 1.56 billion adults will be living with hypertension [2]. Moreover, Nigeria is the country with the most populous black hypertensive patients [3].

In research works carried out independently it has been opined that in spite of the availability of a wide range of anti-hypertensive drugs, hypertension and its complications are still important causes of adult morbidity and mortality in sub-Saharan Africa [4,5]. Furthermore, from studies carried out in a Nigerian population it was put forth that more than 50% of treated hypertensive patients have a blood pressure level greater than 140/90 mm Hg (uncontrolled hypertension) [6,7].

There are excellent clinical outcome trial data proving that lowering BP with several classes of drugs, including angiotensin converting enzyme inhibitors (ACEIs), angiotensin receptor blockers (ARBs),

beta-blockers (BBs), calcium channel blockers (CCBs), and thiazide-type diuretics (D), will all reduce the complications of hypertension.

More than two-thirds of hypertensive individuals cannot be controlled on one drug and will require two or more antihypertensive agents selected from different drug classes [8-11]. For example, in Antihypertensive and Lipid Lowering Treatment to Prevent Heart Attack Trial (ALLHAT), 60 percent of those whose BP was controlled to <140/90 mmHg received two or more agents, and only 30 percent overall were controlled on one drug [12]. In hypertensive patients with lower BP goals or with substantially elevated BP, three or more antihypertensive drugs may be required.

Materials and Methods

This research work is a cross-sectional retrospective study of hypertensive patients conducted at Jericho Specialist Hospital, a government-owned (secondary) healthcare facility in Ibadan, Oyo State. Ibadan is located in the rain forest belt of southwest Nigeria.

The study involved case notes review and use of existing data (spanning 35 months) and is subsumed in a much larger study on drug utilization for which permission was obtained from Ministry of Health and Oyo State Hospitals Management Board. Case notes for the Medical Outpatients were provided by the Records Department of the hospital.

Inclusion criteria are viz.

- Case notes of hypertensive outpatients treated between July 2009 and May 2012
- Hypertensive outpatients, male and female, between 20 and 90 years of age

- Case notes inclusive of, at least, two (2) blood pressure readings with or without record of drugs prescribed (as some patients are placed only on lifestyle modifications)

However, case notes of patients on observation or adjunctive treatment for suggestive or clinically undiagnosed cases of hypertension were excluded. Data on patient's demographic distributions, all blood pressure values from the first visit to the clinics (initial blood pressure, BP) to the final visit (last BP) as well as comorbid conditions were extracted from their case notes. The comorbidities considered were diabetes mellitus and occurrence of cardiovascular diseases (CVD). Use or otherwise of antiplatelet aspirin was recorded as well. Antihypertensive drugs the patients had taken and/or were still taking at the time of the study were documented and grouped into their classes.

The antihypertensive drug classes encountered, and consequently reckoned with, are

- Angiotensin converting enzyme inhibitors (ACEI)
- Angiotensin receptor blockers (ARB)
- Beta-blockers (BB)
- Calcium channel blockers (CCB)
- Centrally acting agents (notably alpha-methyldopa) (ALD)
- Diuretics (D)

Concurrent use of two or more of these was documented appropriately as 2-drug, 3-drug combinations, etc. The pattern of blood pressure control was defined as:

Systolic blood pressure (SBP) and diastolic blood pressure (DBP) controlled:

<140/90 mmHg

SBP controlled: SBP < 140 mmHg and DBP ≥ 90 mmHg

DBP controlled: SBP ≥ 140 mmHg and DBP < 90 mmHg

SBP and DBP uncontrolled: >140/90 mmHg

The sub-group of hypertensive diabetics was analysed separately.

Data was analysed using SPSS (Statistical Package for Social Sciences, Version 17) and was summarized in proportions and percentages as appropriate, using chi-square as test association. Level of significance was at $p < 0.05$.

Results

The characteristics of the study population are shown in Table 1 and age distribution pattern in Figure 1. There was a clear predominance of females (76.7%). The result showed that the mean age was 56.25 ± 12.07 with 65 (23.3%) males (M:F=1:3.3). Of the study population 4.7% were diabetic, 62.3% were taking aspirin. Among the diabetic subgroup, 66.7% were taking aspirin.

	All patients (n=279)	Diabetics (21)
Gender: Male n (%)	65 (23.3)	1 (4.7)
Age (years)	56.25 ± 12.07	54.95 ± 10.4
Systolic blood pressure initial (mmHg)	171 ± 26	165 ± 26
Diastolic blood pressure initial (mmHg)	99 ± 16	97 ± 17

Mean systolic blood pressure (mmHg)	153 ± 24	152 ± 23
Mean diastolic blood pressure (mmHg)	90 ± 14	87 ± 13
Aspirin n (%)	174 (62.3)	14 (66.7)

Table 1: Characteristics of the Hypertensive Patients treated at Jericho Specialist Hospital, Ibadan between July 2009 and May 2012.

Drug Utilization Pattern 2.30 ± 0.92

Level of Blood pressure control 2.88 ± 1.24

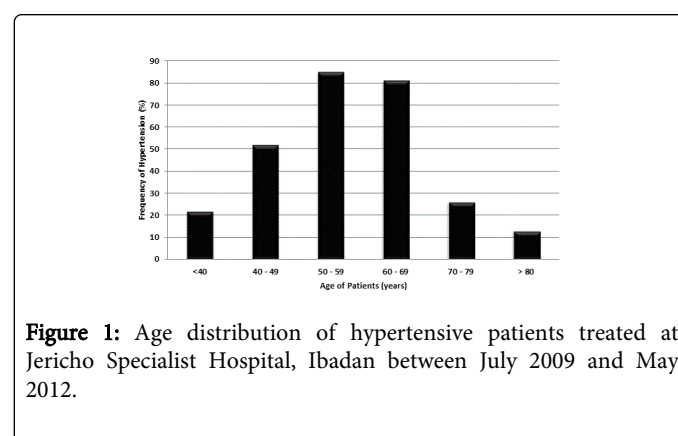


Figure 1: Age distribution of hypertensive patients treated at Jericho Specialist Hospital, Ibadan between July 2009 and May 2012.

The patterns of utilization of antihypertensive drugs are shown in Table 2 and Figure 2. Among the entire study population, diuretics were the most commonly used antihypertensive drugs, which accounted for 78.6%; this was followed by centrally-acting drugs, α -methyldopa (61.4%), calcium channel blockers (50.5%), angiotensin converting enzyme inhibitors (31.2%), beta-blockers (9.5%) while angiotensin receptor blockers accounted for a paltry 0.7%. Of the patients, 86.1% were using two or more antihypertensive drugs while 10.4% were on monotherapy with the remainder on lifestyle modifications. Among diabetics, angiotensin converting enzyme inhibitors and α -methyldopa shared the highest percentage of use, accounting for 66.7%; about 90% of them were using combinations of antihypertensive drugs while approximately 5% were on monotherapy.

	All patients (n=279)	Diabetics (21)
Diuretics n (%)	224 (78.6)	11 (52.3)
Calcium channel blockers n (%)	144 (50.5)	12 (57.1)
Angiotensin converting enzyme inhibitors n (%)	89 (31.2)	14 (66.7)
Alpha-methyldopa n (%)	175 (61.4)	14 (66.7)
Beta-blockers n (%)	27 (9.5)	1 (4.7)
Angiotensin receptor blockers n (%)	2 (0.7)	1 (4.7)
Monotherapy n (%)	29 (10.4)	1 (4.7)
2-drug n (%)	116 (41.6)	6 (28.5)
3-drug n (%)	97 (34.8)	11 (52.3)
4-drug n (%)	26 (9.3)	2 (9.5)
5-drug n (%)	1 (0.4)	0

No drug (lifestyle modification) n (%)	10 (3.6)	1 (4.7)
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Table 2: Utilization pattern of antihypertensive drugs among hypertensive patients treated at Jericho Specialist Hospital, Ibadan between July 2009 and May 2012.

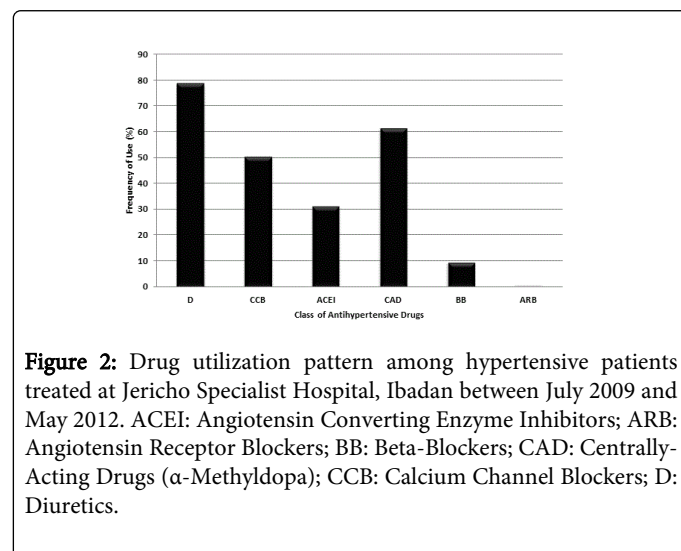


Figure 2: Drug utilization pattern among hypertensive patients treated at Jericho Specialist Hospital, Ibadan between July 2009 and May 2012. ACEI: Angiotensin Converting Enzyme Inhibitors; ARB: Angiotensin Receptor Blockers; BB: Beta-Blockers; CAD: Centrally-Acting Drugs (α -Methyldopa); CCB: Calcium Channel Blockers; D: Diuretics.

Table 3 with Figure 3 comparatively show the effects of drug prescribed on the overall blood pressure control with the respective significance values. Overall, 20.4% of the entire patients have their BP at the World Health Organization (WHO)-recommended target of less than 140/90 mmHg while 56.3% was not controlled. The tables also revealed that SBP was more difficult to control than DBP. The control rates among the subgroup of hypertensive-diabetics are comparable with the entire study population using <140/90 mmHg as the goal. However, when the recommended target of <130/80 mmHg was applied to this subgroup, only 9.5% achieved control while 81% were uncontrolled.

	Pattern of blood pressure control					P-value
	Fully controlled 57 (20.4%)	Fully uncontrolled 143 (51.3%)	Only SBP controlled 18 (6.5%)	Only DBP controlled 61 (21.9%)	Total 279 (100%)	
Gender N (%)						
Male	18 (6.5%)	29 (10.4%)	4 (1.4%)	14 (5.0%)	65 (23.3%)	NS
Female	39 (14%)	114 (40.9%)	14 (5.0%)	47 (16.8%)	214 (76.7%)	
Drugs N (%)						
Diuretics	44 (15.8%)	114 (40.9%)	14 (5.0%)	52 (18.6%)	224 (80.3%)	NS
Centrally Acting Drugs	33 (11.8%)	98 (35.1%)	11 (3.9%)	33 (11.8%)	175 (62.7%)	NS
Calcium Channel Blockers	24 (8.6%)	86 (30.8%)	7 (2.5%)	27 (9.7%)	144 (51.6%)	0.033

Angiotensin Converting Enzyme Inhibitors	13F (4.7%)	48 (17.2%)	5 (1.8%)	23 (8.2%)	89 (31.9%)	NS
Beta Blockers	7(2.5%)	13 (4.7%)	2 (0.7%)	5 (1.8%)	27 (9.7%)	NS
Angiotensin Receptor Blockers	0 (0%)	0 (0%)	1 (0.4%)	1 (0.4%)	2(0.7%)	0.044
Drug usage N (%)						
0	2 (0.7%)	5 (1.8%)	0 (0%)	3 (1.1%)	10 (3.6%)	NS
1 drug	12 (4.3%)	7 (2.5%)	3 (1.1%)	7 (2.5%)	29 (10.4%)	
2 drugs	23 (8.2%)	57 (20.4%)	9 (3.2%)	27 (9.7%)	116 (41.6%)	
3 drugs	17 (6.1%)	58 (20.8%)	6 (2.2%)	16 (5.7%)	97 (34.8%)	
4 drugs	3 (1.1%)	15 (5.4%)	0 (0%)	8 (2.9%)	26 (9.3%)	
5 drugs	0 (0%)	1 (0.4%)	0 (0%)	0 (0%)	1 (0.4%)	

Table 3: Drug Utilization and Pattern of Blood Pressure Control of hypertensive patients treated in Jericho Specialist Hospital between July 2009 and May 2012. Abbreviations: NS = Not significant ($p > 0.05$).

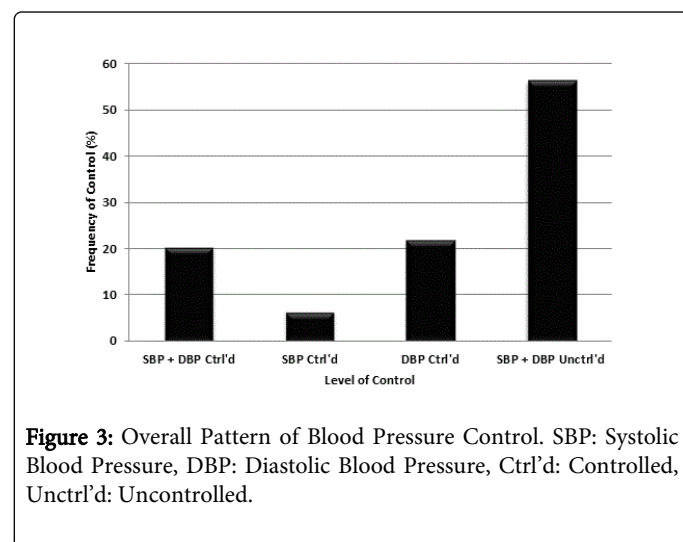


Figure 3: Overall Pattern of Blood Pressure Control. SBP: Systolic Blood Pressure, DBP: Diastolic Blood Pressure, Ctrl'd: Controlled, Unctrl'd: Uncontrolled.

Discussion

The higher proportion of females in this study is in agreement with other studies. For instance, a survey of hypertension control among 536 randomly selected hypertensive patients revealed similar proportions of female patients (M : F; 1 : 63) [13].

The study revealed diuretics were the most commonly prescribed antihypertensive drug group either alone or in combination. Moreover, this study recorded 86.1% use of combination therapy, 10.4% of monotherapy and 20.4% of BP control. For similar studies in Nigeria, the respective results (combination therapy, monotherapy and

BP control) are as follows: 73%, 27% and 33% [14]; 64.4%, 34.7% and 25.4% [13]; a BP control as high as 70.7% was also documented whereas a study in Italy recorded a blood pressure control of 33.5% [1,15]. Review of other studies shows that increased usage of combination therapy is associated with higher proportions of rate of BP control. This is in consonance with the JNC 7 (Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation and Treatment of High Blood Pressure) guidelines that state that small doses of different classes of antihypertensive drugs is more beneficial than a high dose of one [16].

A rather encouraging blood pressure control is mirrored in a much recent study where one hundred and sixteen (116) consecutive hypertensive subjects aged 50.9 ± 8.6 years were studied. Eighty-two (70.7%) of the subjects were fully controlled on the treatment, two on lifestyle modification; while fifteen (12.9%) of the subjects were not controlled at all. Level of blood pressure control in this study is good. Fully controlled subjects were almost twice as many than in the previous study from the same area in spite of co-payment. This suggests health education and patient counseling along with availability of free drug will help to improve adherence to antihypertensive drugs. This in turn impacts positively the blood pressure control [17].

Furthermore, the variance of the overall rate of blood pressure control in this study (20.4%) with most previous findings may be attributed to the much higher predominance of females in this study (about 77%). The closest in percentage of blood pressure control to that obtained in this study are 25.4% [13], and 29% [18] [with the latter having a female percentage of 54.5%]. From literature, females have been relatively less responsive to antihypertensive therapy in spite of meeting up with scheduled clinical visits and better adherence to treatment regimen [19]. A couple of other findings presented BP control rate of 36% and 30.5% respectively, neither of which had a female population in excess of 63% [6,19].

In this study, lifestyle modifications (such as dietary discretion and exercise, etc.) were largely unavailable in the case notes and hence were not documentable in this study just as for drug adherence being a retrospective study. Hence, a carefully planned prospective study focusing on adherence and improvement on blood pressure control would be necessary in further studies.

Although the findings of this study cannot be said to be an absolute representation of the general control pattern in Nigeria as a whole since this is just the experience of a single healthcare centre. Nonetheless, the BP control rate of 20.4% is in keeping with the aggregate figure for the sub-Saharan African region, where the overall control rate was put at <20% in a systematic review [20].

Finally, the strength of this study lies firstly in the unparalleled period of consideration (thirty-five [35] months). Earlier studies have been characterized by a relatively short period of consideration (usually not exceeding three [3] months) [3,21,22] with a tangible majority of them having comparatively smaller sample sizes [14,21-24]. It is noteworthy also that there is no prior study of this kind in a secondary healthcare setting. Furthermore, the result of this study represents a much more recent (and arguably more reliable) assessment of the subject matter and, as such, is hoped to not only merit publication but also attract attention as a renewed, data-driven basis for further research in the management and control of hypertension, ultimately.

Conclusion

This research reveals that the rate of blood pressure control in this part of the world is still rather poor and is apparently worse off than before, implying a decline in the control of hypertension. It is advanced, therefore, that improved adherence to international guidelines for managing hypertension, regarding each strategy of therapy as integral, never as adjunctive as well as a patient-oriented approach that progressively corrects erroneous cultural stereotypes regarding drug utilization, dietary habits and weight gain will make for an improved rate of blood pressure control in the face of an ever-expanding population.

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