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Research Article

Antihypertensive drug use and blood pressure control among in-patients with hypertension in a Nigerian tertiary healthcare centre

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ABSTRACT

Background: Hypertension is a risk factor for coronary heart disease, renal failure, stroke and death if not detected early and treated appropriately. Pattern of drug use provides information on quality of use by comparing the use of drugs with recommended guidelines. This study assessed the pattern of drug use and blood pressure (BP) control among in-patients with hypertension.
Methods: This was a retrospective study carried out on hospitalised patients with hypertension in a tertiary health care centre. Patients' demographic data, clinical findings, and prescription pattern were documented. The average of three consecutive blood pressure (BP) readings prior to discharge was used to assess BP control.
Results: Of 162 patients, 27 (16.7%) and 62 (38.3%) patients were admitted with moderate and severe hypertension respectively. One hundred and fifty three (94.4%) patients were on antihypertensive drugs, out of which 32 (20.9%) had monotherapy, 62 (40.5%) had two antihypertensive combinations, 59 (38.6%) had three or more antihypertensive combinations. The order of antihypertensive drugs use was calcium channel blocker (CCBs) 114 (70.4%), angiotensin converting enzyme inhibitors (ACEIs) 100 (61.7%), diuretics 98 (60.5%), centrally acting agent 24 (14.8%), angiotensin receptor blockers (ARBs) 8 (4.9%), and β-blockers (BB) 8 (4.9%). Blood pressure control was achieved in 48.8% of the patients' population. Factors that negatively influence blood pressure control were presence of co-morbidity (p=0.027). Factor that positively influence blood pressure control was dietary lifestyle modification (p=0.009).
Conclusions: The use of antihypertensive drugs was in accordance with treatment guidelines, but blood pressure was achieved in 48.8% of patients.

Keywords: Antihypertensive drugs, BP, Drug use, Hypertension

INTRODUCTION

Drug utilization studies are concerned with the marketing, distribution, prescription, dispensing and use of drugs in relation to the outcomes of use such as economic, social and clinical consequences.[1,2] It is well known that, for drugs to produce desired therapeutic effects, they have to be safe, efficacious and be used rationally. Pattern of drug use provides information on extent of drug use, trend in drug use and quality of use (rational use pattern) by comparing the use of drugs with national and international guidelines, taking into account the clinical outcomes.[1]

Hypertension is a chronic medical condition that is most commonly seen in primary health care.[3] In Nigeria, hypertension is the most common non-communicable disease and the most frequently diagnosed medical illness in elderly and senior executives.[4,5] Management of hypertension is a key challenge to health care system; however, hypertension can be controlled by lifestyle modification or by the use of antihypertensive drugs or both.[6]

Several guidelines, including the 2014 evidenced based JNC, emphasized lowering blood pressure in patients with hypertension to less than 140/90 mmHg or lesser in

some compelling indications, race or if tolerable.[3,7,8] Clinical trials have shown the roles of antihypertensive drugs like diuretics (D), β-blockers (BB), calcium channel blockers (CCBs), angiotensin converting enzyme inhibitors (ACEIs), angiotensin receptor blockers (ARBs) and centrally acting agents (CAAs) in the reduction of hypertension related morbidity and mortality.[8] Lowering blood pressure to acceptable level in patients often requires combination of two or more of these drugs.[9] However, studies have reported low population of hypertensive patients having their blood pressure controlled.[10-12] In United States (US), Gu et al revealed that treatment of hypertension with the use of multiple antihypertensive drugs increased yearly and has contributed to decrease in morbidity and mortality caused by cardiovascular diseases, but adequate blood pressure control was achieved in less than 32% of these patients.[10] Another study by Cheung et al reported an overall 41% blood pressure control in treated hypertensive patients despite increase in the use of antihypertensive combinations yearly among the Chinese.[11] In one year study of hypertension among South African gold miners, substantial blood pressure control was achieved in 13% of these patients even with the use of more than one antihypertensive drug.[12] Several studies in Nigeria have reported low blood pressure control among patients visiting the outpatient clinics in tertiary hospitals primary healthcare's, and in population where antihypertensive drugs were given free despite frequent use of antihypertensive combinations.[13-15] Hospitalised patients are monitored by health care professionals, compliance is good and blood pressure control is expected to be better among them. This study retrospectively assessed drug use and blood pressure control among hospitalised hypertensive patients in a Nigerian teaching hospital.

METHODS

Study design

This study was a descriptive, cross-sectional, retrospective study on drug use among hospitalized patients with hypertension.

Place of study

The study was carried out at the University College Hospital (UCH), Ibadan, Oyo State, Nigeria.

Sampling method

One hundred and sixty-eight patients' case notes of patients with hypertension admitted within June, 2012 to July, 2013 were retrieved for the study using systematic stratified sampling method. Information collected from patients' case notes were entered into three sectioned questionnaire. The first section contained the socio-demographic information about patients, such as; age, sex, marital status, race, religion, weight, height, etc. The second section contained the clinical information about patients like; co-morbid conditions, family history of hypertension, laboratory biochemical results, length of hospitalization, daily blood pressure readings by physician from period admitted till when discharged. The third section contained information on drugs usage, such as drugs used before and while on admission. Patients discharged against medical advice, patients with incomplete medical records and patients that died while on admission were excluded from this study.

Drug classification

The anatomical therapeutic chemical classification (ATCC) system represents a common language for describing the drug assortment. ATCC was used for drug classification in this study. The ATCC for each drug was obtained from world health organization (WHO) guidelines for anatomical therapeutic chemical classification (ATCC) and defined daily dose (DDD) assignment, 2013.[16]

Blood pressure categorization

Patients' blood pressures on admission were classified according to world health organization-international society of hypertension (WHO/ISH) guidelines.[17] The average of three consecutive blood pressure (BP) readings prior to discharge was taken as BP on discharge. Controlled blood pressure was taken as average BP on discharge < 140/90 mm Hg.[8]

Permission for the study

Approval to carry out the study was obtained from the management of the University College Hospital and Head, Department of medicine, University College Hospital, Ibadan.

Data analysis

Statistical analysis was done using the statistical package for the social sciences (SPSS) version 16.0 software (SPSS Inc., Chicago, United States) and graph pad prism 6.0. Descriptive analyses were used for prevalence of parameters. Chi-square and cross-tabulation analyses were used to asses association between categorical variables (P <0.05).

RESULTS

Of the 162 patients involved in the study, 88 (54.3%) were male, while 74 (45.7%) were female. Majority of the patients were in their middle age 78 (48.2%) and mean age of the patients was 55.7±14.4. Forty-five patients (27.8%) patient were taking alcohol, smoking tobacco or both. Ninety seven patients (59.9%) were obese. One hundred and five patients (64.2%) completed tertiary education, and majority of the patients, 146 (90.2%) were from Yoruba ethnic group. Further information on socio-demographic characteristics of the patients can be found on (Table 1).

Table 1: Socio-demographic characteristics of hypertensive in-patients in a Nigerian tertiary healthcare centre.

Variables	Frequency (%)
Age	
16-44	36 (22.2)
45-64	78 (48.2)
≥65	48 (29.6)
Sex	
Females	74 (45.7)
Males	88 (54.3)
Marital status	
Married	116 (71.6)
Widow	31 (19.1)
Divorced	10 (3.1)
Single	9 (6.2)
Occupation	
Self employed	104 (64.2)
Unemployed/retiree Civil	30 (18.5)
servant	28 (17.3)
Religion	
Christian	102 (63)
Islam	60 (37)
Education	
Tertiary	105 (64.8)
Secondary	46 (28.4)
Primary	11(6.8)
Race	
Yoruba	146 (90.2)
Igbo	14 (8.6%)
Hausa	2 (1.2%)
Alcohol and smoking	
Non-alcoholic non smokers	117 (72.2)
Alcohol only	30 (18.5)
Alcohol and smoking	11 (6.8)
Smokes only	4 (2.5)
BMI *	
Obese	97 (59.9)
Over weight	19 (11.7)
Normal	46 (28.4)

*BMI was classified based on WHO, 1995 classification.[18]

Among these patients, diabetes mellitus was the most commonly diagnosed co-morbid condition. Further information on prevalence of co-morbid conditions among patients can be seen in (Figure 1).

On admission, 27 (16.7%) patients were admitted with grade II hypertension while 62 (38.27%) patients were admitted with grade III hypertension. Majority of the patients were on pharmacotherapy, 153 (94.4%) while 9 (5.6%) patients were not on any antihypertensive medication. Of those on pharmacotherapy, 32 (19.8%) patients were on monotherapy, 62 (38.3%) patients were on two antihypertensive combinations and 59 (36.3%) were on three or more antihypertensive combinations. The prevalence of antihypertensive use in descending order are as follow: calcium channel blockers (CCBs)> angiotensin converting enzymes inhibitors > diuretics > centrally acting methyldopa > β-blockers and angiotensin receptors blockers (Table 2).

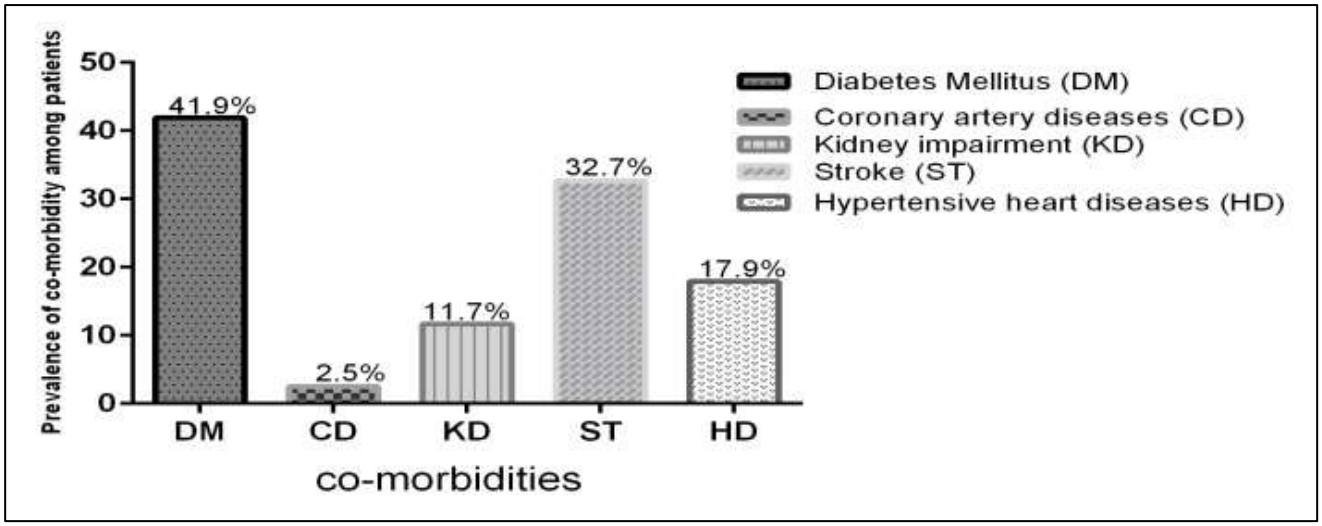
Table 2: Clinical features and prevalence of drug use among hypertensive in-patients in a Nigerian tertiary healthcare centre.

Variables	Frequency (%)
BP on admission*	
<140/90	32 (19.8)
140-159/90-99	41 (25.3)
160-179/100-109	27 (16.7)
≥180/110	62(38.27)
BP on discharge**	
<140/90	79 (48.8)
≥140/90	83 (51.2)
Antihypertensive used	
ACEIs (C09AA)	100 (61.7)
ARBs (C09CA)	8 (4.9)
BB (C07)	8 (4.9)
CAA (C02)	14 (14.8)
CCBs (C08)	114 (70.4)
D (C03)	98 (60.5)
Co-medications	
Aspirin	21 (13.0)
Heparin	48 (29.6)
Insulin Therapy	42 (25.9)
Coartem	7 (4.3)
Metronidazole	67 (41.4)
Augmentin	40 (24.7)
Ceftriazole	37 (22.8)

*Blood pressure on of patients admission was based on Hypertension classification by WHO/ISH guideline.[17] **Blood pressure of patients on discharge was marginalized into normotensive (controlled) (<140/90) and hypertensive (uncontrolled) (≥ 140/90).[8] ACEIs-Angiotensin converting enzymes inhibitors; ARBs-angiotensin receptor blockers; CAA-centrally acting agent (α-methyldopa); CCBs-calcium channel blockers; D-diuretics.

Antibacterial were the most commonly used co-medication. Of these, metronidazole, augmentin and ceftriazole were mostly used among these patients. Anti-malarial was used by 7 (4.3%) of the patients. Other commonly used drugs were insulin and heparin. Aspirin was found to be used by 21 (13%) patients (Table 2).

Substantial blood pressure control (BP < 140/90 mm Hg) was achieved in 79 (48.8%) patients. Factors that negatively influence blood pressure control were presence of co-morbidity (p=0.027). Factor that positively influence blood pressure control was dietary lifestyle modification (p=0.009).



DM-Type 2 diabetes mellitus; CD-coronary artery disease; KD-chronic kidney disease; ST-stroke; HD-hypertensive heart disease.

Figure 1: Prevalence of co-morbidities among hospitalised hypertensive patients.

DISCUSSION

Data on drug utilization among hospitalized patients with hypertension in Nigeria are rare. In this view, these data are of importance with regards to the role of pharmacotherapy in the management of hypertension among patients on admission. This study assessed pattern of drug use and expressed the therapeutic outcome of drug use in terms of blood pressure control among hospitalized patients with hypertension. In general, the result of this study revealed that more than half of the hospitalized patients with hypertension had suboptimal blood pressure control despite been on combination therapy.

Many studies across the globe have reported similar case where minority had optimal blood pressure control, despite increase in the use of antihypertensive pharmacotherapy. An Irish survey found BP controlled in 48.6% of primary health care patients while study based on United States national health and nutrition examination survey (2001-2002) have reported BP control in 53.1% of hypertensive patients.[19-21]

Majority of the patients were in their middle age. There were more male patients than female. Literature search shows that there was no consistency in gender distribution of patients with hypertension in Nigeria. Some studies reported higher percentage of males while some reported higher percentage of female patients with hypertension.[14,15,22,23] It has been reported that women visit hospital often, they have better treatment adherence and better utilization of health care services than men.[24] Male preponderance among in-hospital patients with hypertension in this study may be because male patients do not visit clinic often until when they develop complication of hypertension, which may require hospital admission.

Diabetes mellitus, stroke, hypertensive heart diseases and renal failure were frequently co-diagnosed diseases. In conformity with several studies in Nigeria, diabetes mellitus has been the most prevalent ailment reported among hypertensive patients.[13,14] The co-occurrence of these co-morbidities in hospitalized patients with hypertension will affect the choice of standard pharmacotherapy and achievement of substantial blood pressure control in these patients in line with international treatment guidelines.[3]

As previously reported in some studies on antihypertensive drug utilization pattern among patients visiting the outpatients' clinics in Nigeria, majority of the patients were on two or more antihypertensive drugs.[14,22,25] Combination of antihypertensive drugs among hospitalized patients with hypertension was in line with recommendation of some studies which demonstrated that combination therapy is required in 70% cohort to achieve adequate reduction in blood pressure.[8] The high prevalence of combination therapy usage can be attributed to higher population of patients admitted with moderate and severe hypertension, as well as co-existence of co-morbidities.

Angiotensin converting enzyme inhibitors (ACEIs) were the most commonly used drug as monotherapy. This is an indication that physician often use ACEIs as standard pharmacotherapy in many patients. Evidenced based guidelines buttressed the potentials of ACEIs, and CCBs among blacks and in compelling indication like diabetes mellitus, chronic kidney diseases and target organ damages.[3,7] Higher frequency of ACEIs among patients on monotherapy may be cost related, or due to prevalence of diabetes among the patients.

The use of combination of ACE inhibitors and diuretics or calcium channel blocker have been shown to be beneficial

in black hypertensive patients because combining any drug of these classes have produce significant reduction in blood pressure and mitigate of end-organ damage.[26] Calcium channel blockers (CCBs), diuretics or ACEIs were more frequent in patients on two and three antihypertensive combinations. Several guidelines recommend the use of calcium channel blockers with diuretics in blacks and or with angiotensin converting enzyme inhibitors in the patients with compelling indication like diabetes and chronic kidney diseases.[3,8] Patients taking four or more antihypertensive medication were mostly given centrally acting drug, methyldopa and/ or with β-blockers. Result from this study is an indication that antihypertensive prescription and utilization among in-patients was in accordance with recommended guidelines.

There was high prevalence of antihypertensive combination therapy usage among patients. Yet blood pressures remain suboptimal in more than half of the patients. Severity of blood pressure among hospitalized patients with hypertension seems to encourage physician to intensify treatment or substitute different antihypertensive classes. These patterns of antihypertensive combination use also conform to some studies.[14,15,27,28] Higher mean blood pressure of patients on antihypertensive combination was reported in a study that compared blood pressure between patients taking monotherapy and those on combination therapies.[28]

Limitations of this study was due to retrospective nature of this study, some factors that may influence blood pressure control such as adverse reaction experienced, non-cardiovascular diseases, and surgical operation encountered by the patients were not recorded.

CONCLUSION

In conclusion, antihypertensive utilization conforms to recommended treatment guidelines for patients with hypertension, yet, the blood pressure control among was achieved in less than half of the hospitalized hypertensive patients' population.

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REFERENCES

1. WHO. Introduction to drug utilization research. Geneva: WHO Collaborating Centre for Drug Statistics Methodology, WHO Collaborating Centre for Drug Utilization Research and Clinical Pharmacological Services, 2003.
2. WHO. The selection of essential drugs. World Health Organization, 1977.
3. Himmelfarb CD, Handler J, Lackland DT, LeFevre ML, MacKenzie TD, Ogedegbe O, et al. Evidence-based guideline for the management of high blood pressure in adults report. From the panel members appointed to the eighth joint national committee (JNC8). JAMA. 2013;E1-E14.
4. Ogah OS, Okpechi I, Chukwuonye II, Akinyemi JO, Onwubere BJ, Falase AO, et al. Blood pressure, prevalence of hypertension and hypertension related complications in Nigerian Africans: A review. World journal of cardiology. 2006;4:327-40.
5. Ekere AU, Yellowe BE, Umune S. Mortality patterns in the accident and emergency department of an urban hospital in Nigeria. Nigerian Journal of Clinical Practice. 2005;8:14-8.
6. Becket NS, Peter R, Fletcher AE, Staessen JA, Liu L, Damitrascu D, et al. Treatment of hypertension in patients 80 years of age or older. N Eng J Med. 2008;358:1887-98.
7. Flack JM, Sica DA, Bakris G, Brown AL, Ferdinand KC, Grimm RH, et al. Management of high blood pressure in blacks an update of the international society on hypertension in blacks (ISHIB) consensus statement. Hypertension. 2010;56:780-800.
8. Chobanian AV, Bakris GL, Black HR, Cushman WC, Green LA, Izzo JL, et al. The seventh report of the joint national committee on prevention, detection, evaluation, and treatment of high blood pressure: the JNC 7 report. JAMA. 2003;289:2560-71.
9. Yusuf S, Sleight P, Pogue J, Bosch J, Davies R, Dagenais G. Effects of an angiotensin-converting-enzyme inhibitor, ramipril, on cardiovascular events in high-risk patients. The heart outcomes prevention evaluation study investigators. The New England journal of medicine. 2000;342:145-53.
10. Gu Q, Ram RP, Dillon C, Vicki. Antihypertensive medication use among us adults with hypertension. Circulation. 2006;113:213-21.
11. Cheung BMY, Wong YL, Lau CP. Queen mary utilization of antihypertensive drugs study: use of antihypertensive drug classes in the hypertension clinic 1996-2004. B J clinical Pharmacol. 2005;60:90-7.
12. Maepe LM, Outhoff K. Hypertension in goldminers. SAMJ. 2012;102:30-3.
13. Tamuno I, Babahani M. Blood pressure control amongst hypertensive patients in a tertiary health care facility in Nothern Nigeria. Res J Med Sci. 2012;6:26-32.
14. Yusuff KB, Balogun O. Physician's prescribing of antihypertensive combinations in a tertiary care setting in southwestern Nigeria. J Pharm Pharm Sci. 2005;8:235-42.

15. Salako BL, Ajose FA, Lawani E. Blood pressure control in a population where antihypertensives are given free. East Afr Med J. 2003;80:529-31.
16. WHO collaborating centre for drug statistics methodology: guidelines for ATC classification and DDD assignment 2014. Oslo. 2013.
17. WHO/ISH. 2003 world health organization (WHO)/international society of hypertension (ISH) statement on management of hypertension. Journal of Hypertension. 2003;21:1983-92.
18. WHO. Physical status: the use and interpretation of anthropometry. Report of a WHO expert committee. WHO technical report series 854. Geneva: world health organization. 1995.
19. Buckley B, Shanahan E, Colwell N, Turgonyi E, Bramlage P, Perry, IJ. Blood pressure control in hypertensive patients in Irish primary care practices. J Clin Hypertens. 2009;11:432-440.
20. Cheung BMY, Ong KL, Man YB, Lam KS, Lau CP. Prevalence, awareness, treatment, and control of hypertension. United States national health and nutrition examination survey 2001-2002. J Clin Hypertens. 2006;8:93-8.
21. Brewster LM, Van-Montfrans GA, Kleijnem J. Systematic review: antihypertensive drug therapy in black patients. Ann Intern Med. 2004;141:614-27.
22. Ukwe CV, Ubaka CM. Antihypertensive drug prescribing in a tertiary hospital in Eastern Nigeria. Tropical Journal of Pharmaceutical Research. 2012;11:297-305.
23. Oyati AI, Orogade AA, Danbauchi SS, Azuh PC. Awareness, treatment and control of hypertension among hypertensives in Zaria. Journal of Medicine in the Tropics. 2011;13:139-44.
24. Steyn K, Bradshaw D, Norman R, Laubscher R. Determinants and treatment of hypertension in South Africans: the first demographic and health survey. S Afr Med J. 2008:98;376-80.
25. Isezuo AS, Njoku CH. Blood pressure control among hypertensives managed in a specialized health care setting in Nigeria. Afr J Med Med Sci. 2003;32:65-70.
26. Sica DA. The African American study of kidney disease and hypertension (AASK) trial: what more have we learned? J Clin Hypertens. 2003;5:159-67.
27. Adedapo ADA, Sikuade O, Adeleke S, Okechukwu R. Drug utilization and blood pressure control in a population where anti hypertensives are given free: effect of policy change. Afr J Med Sc. 2012;41:349-56
28. Etuk E, Isezuo SA, Chika A, Akuche J, Ali M. Prescription pattern of anti-hypertensive drugs in a tertiary health institution in Nigeria. Annals of African Medicine. 2008;7:128-32.

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