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Prescribing Pattern of Antihypertensive Medications in a Geriatric Center In South Western Nigeria

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A – research concept and design; B – collection and/or assembly of data; C – data analysis and interpretation; D – writing the article; E – critical revision of the article; F – final approval of article.

Abstract

Background: Hypertension is a prominent public health problem, with considerable health consequences. Recommended guidelines encourage use of antihypertensive medications with the best evidence of reducing cardiovascular risk. Data on antihypertensive medications use among older Nigerians is limited.
Objective: This study evaluated the antihypertensive medication use among older persons with hypertension in compliance with the Eighth Joint National Committee guidelines (JNC 8).
Method: A retrospective cross-sectional study, of older patients diagnosed with hypertension between the 1st January 2017 and 31st December 2017 at the geriatric center, University College Hospital, Ibadan.
Results: The mean age was 70.2 ± 7.2 years and 62% were female. The mean number of medications used by the patient was 4.5 ± 1.4. Of the patients, 56% were receiving combination therapy, 42% two drugs and 14% three drugs. Most patients were receiving calcium channel blockers (33.8%), followed by diuretics (29.6%), angiotensin receptor blockers (23.4%) and angiotensin-converting enzyme inhibitors (10.8%). Commonest combination therapy was calcium channel blockers and thiazide diuretics (28.3%), while the commonest multi-morbidities were osteoarthritis (32.7%), diabetes (17.3%) and dyslipidemia (8.7%).
Conclusion: This study showed that more than half of older persons with hypertension were on combination therapy, and the most frequently used class of antihypertensive drugs were calcium channel blockers, followed by diuretics. The guidelines and data for black ≥60 years indicate that lower doses of combination therapy are more effective in achieving blood pressure target. Despite the numerous advantages of ACEIs, they remain underutilized.

Keywords: Hypertension, older persons, antihypertensive drugs, prescription pattern, Nigeria

INTRODUCTION

The management of hypertension can give an understanding of rational drug use patterns. Hypertension is an important public health problem and the prominent risk factor for many cardiovascular diseases (CVD), cerebrovascular accident (CVA) and renal failure. It is anticipated that over one billion adults are hypertensive worldwide and this figure is estimated to rise to 1.56 billion by the year 2025 (Adeloye et al., 2015; Beaglehole et al., 2011). Cardiovascular diseases including hypertension account for the loss of 4% gross domestic product (GDP) for low and middle-income countries (LMIC) annually which is estimated to be 500 billion USD (WHO, 2013). Clinical data recommend that reducing blood pressure (BP) with antihypertensive drugs decreases the risk of myocardial infarction, stroke, heart failure, revascularization procedures and end-stage renal diseases in hypertensive patients (James et al., 2014). The rising prevalence of hypertension has been attributed to population growth, aging and

behavioral risk factors, such as unhealthy diet, excess use of alcohol, sedentary lifestyle, obesity, and exposure to assiduous stress (Jarari et al., 2016). Prevention of morbidity and mortality associated with hypertension is the major target of antihypertensive therapy, non-adherence to antihypertensive therapy and is a cause of uncontrolled hypertension (Egan et al., 2010).

Older patients usually have several conditions requiring multiple medications approach to treatment leading to polypharmacy (Akande-Sholabi et al., 2018a). Medication monitoring and reconciliation by healthcare workers can detect medication errors while prescribing and dispensing and provide feedback to prescribers. Several classes of antihypertensive drugs are utilised in the management of hypertension, and this include β-blockers (BB), calcium channel blockers (CCBs), angiotensin-converting enzyme inhibitors (ACEIs), angiotensin II receptor blockers (ARBs) and diuretics (D) which comprise of (Thiazide diuretics (TD), Loop diuretics (LD) and Potassium-sparing diuretics (PSD).

The United State Eighth Joint National Committee on Prevention, Detection, Evaluation, and Treatment of high blood pressure (JNC 8) is a recommended guideline for the management of hypertension. A 2014 report from panel members of (JNC 8) suggested that for black patients aged ≥60 years, blood pressure should be targeted to <150/90 mmHg and managed with CCBs and thiazide as the first line, add-on of ACEIs or ARBs as second line and CCBs plus ACEIs or ARBs plus thiazide as third line (James et al., 2014).

About 9.4 million deaths occur worldwide every year because of hypertension, with it being accountable for approximately 50% of mortality owing to heart disease and stroke (WHO, 2008). According to the World Health Organisation (WHO), the prevalence of hypertension is highest in the African region at 38.1% among males and 35% among females, with the lowest in America (WHO, 2014). The prevalence of hypertension in Nigeria may form a considerable fraction of the total burden in Africa because of the large population currently estimated to be over 170 million (Adeloye et al., 2015; WHO, 2005; Akinlua et al., 2015; WBN, 2013). Epidemiological studies established that hypertension prevalence is increasing in Nigeria, varying from 19% to 33.1%, in urban and 26.4% in the rural population (Adeloye et al., 2015; Ajayi et al., 2016; Ogah et al., 2012). It has been reported that antihypertensives account for 34.7% of prescribed medications among older persons in South Western Nigeria (Akande-Sholabi et al., 2018b). In Nigeria, there is limited information about antihypertensive medication use in older persons. To understand existing medication utilization patterns among older persons with hypertension in South Western Nigeria, this study was initiated to identify the prescribing patterns of antihypertensive medications and other multimorbidities in geriatric patients and compare adherence with JNC-8 guidelines.

The aim of the study was to describe the prescribing patterns of antihypertensive medications among older persons at the Chief Tony Anenih Geriatric Centre (CTAGC), University College Hospital (UCH), Ibadan and compare with JNC-8 recommendations.

METHODOLOGY

Study sites and settings

This study was carried out at the Chief Tony Anenih Geriatric Centre (CTAGC), University College Hospital (UCH), Ibadan, which is the capital city of Oyo State in the south-western area of Nigeria. Ibadan has a population of 3.6 million inhabitants, while Oyo state has 5.6 million people according to the Nigerian 2006 census (NPC, 2006). The Chief Tony Anenih Geriatric Centre, UCH is a purpose-built geriatric facility which was commissioned on the 17th November 2012 and has registered 13,524 elderly patients. The geriatric center attends to an average of 110 older patients each day. The CTAGC has nine beds for in-patient admission and currently added a 20-bedded geriatric rehabilitation center. There are nine units at the CTAGC, UCH including the Health Information unit where the electronic records of all registered older patients are stored. The study was carried out by reviewing case files of hypertensive patients seen at the center. Case files for the hypertensive older patients were provided by the Medical Records Department of the center.

Study design

This was a retrospective cross-sectional, hospital-based study which was carried out at the Chief Tony Anenih Geriatric Centre (CTAGC), University College Hospital (UCH), Ibadan. Prescribing pattern between 1st January 2017 and 31st December 2017 of three hundred older patients who were registered and diagnosed with hypertension for at least six months at this centre as at the time of commencement of this study were reviewed. A data extraction sheet was used to obtain information on sociodemographic characteristics such as age, sex, ethnicity and occupational status. In addition, past medical history such as duration of hypertension, and other morbidities was added. Information on the medications use which included the types of antihypertensives, duration of use of the

antihypertensives, dosages, and frequency of use was included.

Sample size determination

The sample size was calculated using the Leslie and Kish formula for single proportion using the assumed prevalence of 45.6% (Cadmus et al., 2017). In all, 382 older persons case files were reviewed. The systematic random sampling method was employed, the CTAGC, UCH registered 2,545 patients between 1st January 2017 and 31st December 2017. An average of 1,160 (45.6% x 2,545) older patients with hypertension was registered in the past year. Since the sample size is 382, the sample interval is 3.03 (1,160/382) ≈ 4. Thus, one in every four older patients who were registered between January 1st and December 31st, 2017 were recruited.

Data analysis

Data was sorted, coded and entered into SPSS statistical software version 21.0 for cleaning and analysis. Descriptive statistics including frequency, percentage, and mean ± standard deviation was used to summarise data. Continuous data were presented as mean ± standard deviation (SD), while categorical data were presented as frequency and percentages.

Inclusion criteria: Male and female patients aged 60 years and above who were registered at the CTAGC, UCH, Ibadan during the study period with the diagnosis of hypertension for at least 6 months were recruited.

Exclusion criteria: Male and female patients aged 60 years and above who were registered at the CTAGC, UCH, Ibadan during the study period, who were not diagnosed with hypertension.

RESULTS

Of the 382 patients case files retrieved, 300 (79%) patients case files had complete data and were included in the analysis. The characteristics of the studied patients are given in Table 1. The mean age of the patient populace was 70.2 ± 7.2 years, 62% were female, 54.3% were retired and 94% were Yoruba. About one-third of the patients were receiving calcium channel blockers (33.8%), followed by thiazide diuretic (28.6%), angiotensin receptor blockers (23.4%), angiotensin-converting enzyme inhibitors (10.8%) and β-blockers (2.4%).

The average number of drugs consumed by the patient was 4.5 ± 1.4. Combination therapy was used more commonly than monotherapy (56% vs 40.7%). Of the patients, 73.3% have blood pressure measurement of <150/90mmHg. Multi-morbidity defined as the presence of one or more additional disease was found in 71.3% of the patients. Osteoarthritis (32.7%) were the commonest recognized, followed by diabetes (17.3%), Urinary tract infection (10.7%), dyslipidemia (8.7%), malaria (4.7%) and stroke (3.7%). The frequency of distribution is shown in Table 2.

Table 3 shows the pattern of use of antihypertensive drugs in patients receiving monotherapy or combination therapy. Of the patients, 122 (40.7%) were receiving monotherapy, 126 (42%) two drugs and 42 (14%) three drugs, 10 (3.3%) patients were on no drug therapy. Most patients were receiving calcium channel blockers (33.8%), followed by thiazide diuretic (28.6%), ARBs (23.4%), ACEIs (10.8%), β-blockers (2.4%), loop diuretics (0.6%) and potassium sparing diuretics (0.4%). Two drug class treatments were the most common in patients receiving combination therapy. Among the patients on two drug class combination therapy, 85 (28.3%) received a combination of CCBs + TDs, followed by ARBs + TDs 54 (18%), CCBs +ARBs 34 (11.3%), CCBs + ACEIs 30 (10%), ACEIs + TDs 14 (4.7%), CCBs + BBs 6 (2%) and CCBs + LDs 1(0.3%). For the 42 patients on combination treatment with three drug class, 7 different combinations were prescribed. The most frequently prescribed three-drug class combinations included, in order of decreasing frequency, CCBs + ARBs + LDs, CCBs + ACEIs + TDs, CCBs + TDs + ARBs, ARBs + TDs + ACEIs, CCBs + BBs + ACEIs, CCBs + BBs + ARBs and ARBs + PSDs + TDs.

The pattern of antihypertensive medication use in hypertensive patients with specific multimorbidities shows that diuretics were the most commonly used agents, followed by ARBs, ACEIs, and CCBs. Among the patients on two drug class treatment CCBs + ARBs were the most frequently used and CCBs + LDs + ARBs were the commonest among patients with three drug class treatment, while BBs, were used less frequently, as shown in Table 4.

Table 1: Characteristics of reviewed patients (N= 300)

Variable	Frequency	Percentage
Age range (years)		
60-69	148	49.3
70-79	120	40.0
80-89	31	10.4
90-99	1	0.3
Sex		
Male	114	38.0
Female	186	62.0
Occupation		
Retired	163	54.3
Not retired	137	45.7
Ethnicity		
Yoruba	282	94.0
Edo	12	4.0
Igbo	5	1.7
Delta	1	0.3
Ψ Drugs (N=500)	**Responses**	
	n	Percentage (%)
ACEI	54	10.8
ARB	117	23.4
BB	12	2.4
CCB	169	33.8
LD	3	0.6
PSD	2	0.4
TD	143	28.6

**Data are presented as the frequency (n) with the percentage given in parenthesis (%)*

***NB**: ACEI=Angiotensin-converting enzyme inhibitor; ARB=Angiotensin receptor blockers; BB=Beta blockers; CCB=Calcium channel blockers; LD=Loop diuretic; PSD=Potassium sparing diuretic; TD=Thiazide diuretic*

***Ψ-** Multiple responses.*

Table 2: Clinical Profile of patients (N=300)

Variable	Frequency	Percentage
Co-morbidities		
Yes	214	71.3
No	86	28.7
List of other morbidities		
Allergy	5	1.7
Cataract	25	8.3
Dementia	8	2.7
Diabetes	52	17.3
Dyslipidemia	26	8.7
Malaria	14	4.7
Osteoarthritis	98	32.7
Peptic Ulcer Disease	8	2.7
Stroke	11	3.7
Urinary incontinence	3	1.0
Urinary tract infection	32	10.7
Others	18	5.8
Antihypertensive therapy		
Monotherapy	122	40.7
Combination therapy	168	56.0
No therapy	10	3.3
Number of medications per patient		
Mean 4.5 ± 1.4		
Blood Pressure		
<150/90mmHg	220	73.3
≥ 150/90mmHg	80	26.7

Data are presented as the number (n) with the percentage given in parenthesis (%) or the mean ± standard deviation

Table 3: Pattern of antihypertensive drug use among the studied patients (monotherapy and combination therapy)

Variables	n	Percentage
No of antihypertensives		
1 drug	122	40.7
2 drugs	126	42.0
3 drugs	42	14.0
No drug	10	3.3
Total	300	100
2 Drug class combinations	**Number of prescriptions**	**Percentage receiving combination therapy (%)**
CCBs + TDs	85	28.3
ARBs + TDs	54	18.0
CCBs + ARBs	34	11.3
CCBs + ACEIs	30	10.0
ACEIs+ TDs	14	4.7
CCBs+ BBs	6	2.0
CCBs + LDs	1	0.3
3 Drug class combinations		
CCBs+ ARBs + LDs	25	8.4
CCBs +ACEIs +TDs	8	2.7
CCBs + BBs + ARBs	4	1.3
CCBs +TDs +ARBs	2	0.7
ARBs + TDs + ACEIs	1	0.3
CCBs +BBs + ACEIs	1	0.3
ARBs + PSDs+ TDs	1	0.3

ACEI=Angiotensin-converting enzyme inhibitor; ARB=Angiotensin receptor blockers; BB=Beta blockers; CCB=Calcium channel blockers; LD=Loop diuretic; PSD=Potassium sparing diuretic; TD=Thiazide diuretic

Table 4: Pattern of antihypertensive medication use in hypertensive patients with Co-morbidity (monotherapy and combination therapy)

Associated disease	N	Diuretics (%)	BB (%)	ACEI (%)	ARB (%)	CCB (%)
Diabetes	52	44.2	33.3	31.2	21.2	18.7
Dyslipidemia	26	46.2	0.0	2.1	18.6	7.2
Osteoarthritis	98	33.7	41.7	18.8	34.5	27.7
Stroke	11	45.5	0.0	16.2	1.8	3.0

Associated disease	CCB + ACEI (%)	CCB + ARB (%)	CCB + TD (%)
Diabetes	16.7	20.6	16.5
Dyslipidemia	26.7	26.5	15.3
Osteoarthritis	3.3	20.6	9.4
Stroke	6.7	0.0	1.2

Associated disease	CCB + ARB + LD (%)
Diabetes	20.0
Dyslipidemia	24.0
Osteoarthritis	16.0
Stroke	0.0

ACEI=Angiotensin-converting enzyme inhibitor; ARB=Angiotensin receptor blockers; BB=Beta blockers; CCB=Calcium channel blockers; LD=Loop diuretic; PSD=Potassium sparing diuretic; TD=Thiazide diuretic

DISCUSSION

Hypertension is one of the most significant risk factors for cardiovascular morbidity and mortality. The mean age of the patients in this study was 70.2 ± 7.2 years. The higher proportion of females in this study agrees with findings from another study in Nigeria (Adejumo et al., 2017). The higher prevalence of female in this study may explain the better health-seeking behavior of older women than men as documented by Abdulraheem (Abdulraheem, 2007). This study reported the mean of drugs per patient as 4.5 ± 1.4, this correlates with the findings of ≥ 4 average drugs consumed by the older patient at the geriatric center (Akande-Sholabi et al., 2018a). This might be sufficient to conclude that polypharmacy is frequent among older patients mainly because of multiple morbidities. An average number of drugs per prescription reported in Tanzania was 2.4 as compared to 4.5 observed in this study in Nigeria (WHO, 1994). Calcium channel blockers and thiazide diuretics were the most commonly prescribed antihypertensive either alone or as a combination therapy in this study. This high use of CCB and TD in this study agrees with the recommendations of the JNC 8 (James et al., 2014). This might reflect the effectiveness of both CCB and thiazide diuretics in this environment and the awareness of the physicians for adhering to the guidelines. It is not surprising that thiazide diuretics were one of the most frequently used hypertensive drugs. It has been recognized that hypertension in blacks is commonly volume dependent and responsive to these medications. Thiazide diuretics are also relatively inexpensive when compared with other classes of antihypertensive medication. However, the guidelines recommend combination therapy as the first step treatment, especially in patients who are ≥60 years with multimorbidities (including diabetes) and of black origins. It states that low dose of different classes of antihypertensive drugs is more beneficial than a high dose of one (James et al., 2014). In this study, 56% of the patients were receiving combination therapy even though patients with multi-morbidity account for 71.3% of the total studied patients. This indicates that more patients might benefit from receiving combination therapy considering the high proportion of patients with multi-morbidity. Similarly, studies from other parts of Nigeria, Benin (82.2%) and Lagos (97.5%) revealed high prevalence of combination therapy (Adejumo et al., 2017; Bakare et al., 2017).

Nonetheless, data from this study shows that 73.3% of the older patients have blood pressure reading of <150/90mmHg, which is within the recommendation of the guidelines. Erstwhile, studies in both developing and developed countries have reported blood pressure control rate to be between 33% and 70.7% (Sani et al., 2008; Wang et al., 2005). Various factors such as medication adherence, affordability of antihypertensive medications, and differences in education delivery and counseling by health workers, account for this variation (Sani et al., 2008; Wang et al., 2005).

The most common antihypertensive two drug class combinations used were CCB +TD and three drug

class combinations CCB +ARB+LD. This pattern of antihypertensive medication use showed compliance with the Eighth Joint National Committee Guidelines on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure (JNC 8) (James et al., 2014). Hypertension constituent a key risk factor for stroke, heart failure, coronary heart disease, and end-stage renal disease. Diabetes and chronic renal failure are also commonly associated with hypertension. The guidelines recommend ACE inhibitors as the preferred drug for hypertension in congestive heart failure and diabetes; ACE inhibitors or diuretics for recurrent stroke prevention; and BBs for those with prior myocardial infarction management of hypertension (James et al., 2014). In contrast with these recommendations, ACE inhibitors were used less than ARBs in patients with those comorbidities as a combination therapy, but ACEIs were used more as a monotherapy in this study. The results showed that the ARBs are used more frequently as combination therapy, this might be due to intolerance of hypertensive patients to ACEIs, such as persistent dry cough.

Medication adherence, lifestyle modification, complications of hypertension, the frequency of clinic attendance and severity of hypertension at the start of treatment, which could affect the choice of antihypertensive drugs and blood pressure control were not assessed in this study. Also, this study was carried out in the only geriatric center in Nigeria and thus might affect our findings and cannot be generalized to the older patients across Nigeria. A simple and inexpensive audit such as this study will contribute valuable evidence to the literature regarding the pattern of prescribing antihypertensive drugs in the older persons and provide health systems and specific facilities with a benchmark for monitoring and evaluating progress on growing public health concerns in Nigeria and worldwide.

CONCLUSION

This study showed that more than half of the older persons with hypertension at the geriatric center received combination therapy, although guidelines and data for blacks ≥60 years indicate that combination therapy is more effective in achieving BP target. It was also discovered that the most frequently used classes of antihypertensive drugs were CCBs, diuretics, and ARBs. Despite the numerous advantages of ACEIs, they remain underutilized. Moreover, the most frequently used drugs in older hypertensive patients with co-morbidity were still CCBs and diuretics. Continuous awareness, efforts, and monitoring evaluations are needed to improve antihypertensive medication use among older persons.

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ETHICAL APPROVAL

The study received approval from the joint University of Ibadan/University College Hospital Institutional Ethical Review Board with IRB No (EC/18/0172).

REFERENCES

Abdulraheem, I.S. (2007). Health needs assessment and determinants of health-seeking behavior among elderly Nigerians: A house-hold survey. *Ann Afr Med.* 6(2): 58-63.

Adejumo, O., Okaka, E., Iyawe, I. (2017). Prescription pattern of antihypertensive medications and blood pressure control among hypertensive outpatients at the University of Benin Teaching Hospital in Benin City, Nigeria. *Malawi Med J*. 29(2): 113-117.

Adeloye, D., Basquill, C., Aderemi, A. V., Thompson, J. Y., Obi, F. A. (2015). An estimate of the prevalence of hypertension in Nigeria: a systematic review and meta-analysis. *J Hypertens*. 33(2): 230-42.

Ajayi, I., Sowemimo, I., Akpa, O., Ossai, N. (2016). Prevalence of hypertension and associated factors among residents of Ibadan-North Local Government Area of Nigeria. *Niger J Cardiol*. 13(1): 67-75.

Akande-Sholabi, W., Adebusoye, L. A., Olowookere, O. O. (2018a). Polypharmacy and factors associated with their prevalence among older patients attending a geriatric centre in South-West Nigeria. *West Afri J Pharm* 21(1): 35-45.

Akande-Sholabi, W., Adebusoye, L. A., Olowookere, O. O. (2018b). Potentially inappropriate medication use among older patients attending a geriatric centre in south-west Nigeria. *Pharm Pract*. 16(3): 1235.https://doi.org/10.18549.

Akinlua, J. T., Meakin, R., Umar, A. M., Freemantle, N. (2015). Current prevalence pattern of hypertension in Nigeria: A Systematic Review. *PLoS ONE.* 10(10): e0140021.

Bakare, O. Q., Akinyinka, M. R., Goodman, O., Kuyinu, Y. A., Wright, O. K., Adeniran, A., Odusanya, O. O., Osibogun, A. (2017). Antihypertensive use, prescription patterns, and cost of medications in a Teaching Hospital in Lagos, Nigeria. *Niger J ClinPract*. 19(5): 668-72.

Beaglehole, R., Bonita, R., Alleyne, G., Horton, R., Li, L.,Lincoln, P.,Mbanya, J. C., McKee, M., Moodie, R., Nishtar, S., Piot, P., Reddy, K. S., Stuckler, D. (2011). UN High-Level Meeting on Non-Communicable Diseases: addressing four questions. *The Lancet*. 378(9789): 449-455.

Cadmus, E. O., Adebusoye, L. A., Olowookere, O. O., Oluwatosin, O. G, Owoaje, E. T., Alonge, T. O. (2017). A descriptive study of the morbidity pattern of older persons presenting at a Geriatric Centre in Southwestern Nigeria. *Niger J ClinPract*. 20: 873-8.

Egan, B. M., Zhao, Y., Axon, R. (2010). US trends in prevalence, awareness, treatment, and control of hypertension, 1988-2008. *JAMA*. 303(20): 2043-2050.

James, P. A., Oparil, B.L., Carter, S., Cushman, W.C., Dennison-Himmelfarb, C., Handler, J., Lackland, D.T., LeFevre, M.L., MacKenzie, T.D., Ogedegbe, O., Smith, S. C. Jr, Svetkey, L.P., Taler, S.J., Townsend, R.R., Wright, J.T. Jr, Narva, A.S., Ortiz, E. (2014). Evidence-based guideline for the management of high blood pressure in adults: Report from the panel members appointed to the eighth joint national committee (JNC 8). *JAMA*. 311(5): 507-520.

Jarari, N., Rao, N., Peela, J.R., Ellafi, K.A., Shakila, S., Said, A.R., Nelapalli, N. K., Min, Y., Tun, K.D., Jamallulail, S., Irawal, A.K., Ramanujam, R., Yedla, R. N., Kandregula, D. K., Argi, A, Peela, L.T. (2016). A review on prescribing patterns of antihypertensive drugs. *Clinical Hypertension.* 22: 7.

National Population Commission of Nigeria. (2006). *National and states population and housing tables.* Population and housing census of the Federal Republic of Nigeria. Retrived February 14, 2018 from URL: .

Ogah, O. S, Okpechi, I., Chukwuonye, I. I., Akinyemi, J. O., Onwubere, B. J. C., Falase, A.O. (2012). Blood pressure, prevalence of hypertension and hypertension related complications in Nigerian Africans: A review. *World J Cardiol*. 4(12): 327-340.

Sani, M.U., Mijinyawa, M.S., Adamu, B., Abdu, A. Borodo, M.M. (2008). Blood pressure control among treated hypertensive in a tertiary health institution. *Niger J Med.* 17(3): 270-273.

Wang, T. J., Vasan, R .S. (2005). Epidemiology of uncontrolled hypertension in the United States. *Circulation.* 112(11):1651-1662.

World Bank Nigeria. (2013). Retrieved November 29, 2017 from URL: .

World Health Organisation AFRO, Report of regional director: cardiovascular diseases in the African region: current situation and perspectives. Regional committee for Africa *(2014); Maputo, Mozambique: The WHO Regional Office for Africa.* 2014. Retrieved May 19, 2019 from URL:https://www.afro.who.int.

World Health Organization Geneva, Causes of Death. Retrieved December 30, 2017 from URL: (http: //.

World Health Organization, A global brief on hypertension: silent killer, global public health crises (World Health Day 2013). Geneva*: WHO 2013;* Retrieved February 11, 2018 *from URL: http://www.ish-world.com*.

World Health Organization, Guide to Good Prescribing.Geneva: WHO; 1994.

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