

**Original Article**

**ADHERENCE TO ESSENTIAL HYPERTENSION TREATMENT GUIDELINES IN A TERTIARY HOSPITAL IN NIGERIA**

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**ABSTRACT**

**Objective:** This study determined the level of prescribers' adherence to the World Health Organization/International Society of Hypertension (WHO/ISH) guidelines for the management of hypertension at the Lagos University Teaching Hospital (LUTH), Nigeria.

**Methods:** This study employed a retrospective cross-sectional design. Two groups were used: Group A (300 patients) were treated before the guidelines review in 2003, while Group B (200 patients) were treated after. The two study groups were compared, and systolic blood pressure of 130 mm Hg or above was taken as the index of hypertension.

**Results:** There were 198 (66%) male patients in Group A, while Group B had 136 (68%) males. The highest age for Group A was 50–59 y for 89 (30%) patients, unlike group B that had 58 (29%) patients in aged 40–49 y as the highest. The highest blood pressure range for patients in Group A was 150–159 mm Hg for 64 (21%) patients, unlike Group B that had 43 (22%) patients as the highest in the same range. Furosemide was present in 282 (24%) prescriptions for group A patients. However, atenolol was present in 61 (20%) prescriptions for the same group. In group B, Furosemide was prescribed in 197 (97%) encounters, while Nifedipine was found in 81(40%) prescriptions.

**Conclusion:** Prescribers at LUTH complied substantially with WHO/ISH guidelines in the management of hypertension. Diuretics and beta-blockers were used before the guideline review. After the review, diuretics and calcium channel blockers were the most frequently prescribed antihypertensives.

**Keywords:** Hypertension, Adherence, Treatment Guidelines, WHO/ISH

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**INTRODUCTION**

Hypertension is unarguably a vital health concern worldwide despite the recent advances in the management of the disease. It is a severe medical condition that significantly increases the chances of having the diseases of vital organs like kidney, brain, and heart.

Almost 1.13 billion individuals all over the world are hypertensive, and two-thirds are found in low and average income nations [1]. The least prevalence is in rural India (6.8% in females and 3.4% in males), while the highest prevalence is in Poland (72.5% in females and 68.9% in males) [2]. In 2015, one in four males and one in five females had hypertension. According to the World Health Organisation, it plans to reduce the prevalence of hypertension and other non-communicable diseases by 25% in 2025 [1].

According to the International Society of Hypertension (ISH), hypertension predisposes Africans at higher risk of other diseases than individuals of different continents. In Africans, increased blood pressure is 3 to 5 times more likely to cause renal complications than the same level of elevation in blood pressure among individuals of Caucasian origin. However, Africans are more likely to be more sensitive to the intake of salt. They may not respond to treatment with Beta-blockers, Angiotensin Receptor Blockers (ARBs), and Angiotensin Receptor Enzymes inhibitors (ACEIs) [3].

The ISH panel also defined hypertension based on pharmacological treatment anchored on the latest therapy cut-offs. For the patients in the age range of 18 to 79 y (adults), a systolic blood pressure  $\geq 140$  mmHg, and a diastolic blood pressure level  $\geq 190$  mmHg that continues repeatedly could require the necessity for pharmacological treatment. However, in individuals above 80 y, the systolic blood pressure levels must be higher than 150 mmHg before any diagnosis can be confirmed.

The ISH also advocates for the classification of hypertension into stages: 1 and 2. Stage 1 is levels 140-159/90-99 mmHg while 2 is  $\geq 160/>100$  mmHg. The causes of hypertension are not fully understood. However, environmental and dietary parameters such as high intake of salt, dormant lifestyle, and obesity may aid the development of hypertension. There are so many genetic risk factors that may be implicated. Also, hypertensive patients that can be treated by the correction of hidden elements in the body system. However, less than 5% of all hypertensive patients belong to this category.

The ISH guideline emphasizes the need for detecting the intrinsic causative factors in some individuals [3]. Guidelines are essential considerations in clinical decisions. They ensure that differences in practice are reduced to the barest minimum. They also ensure appropriateness in therapy as well as to measure the quality of care [4].

The Joint National Committee (JNC 8) guidelines advise sustainable blood pressure goals and minimal use of different classes of antihypertensive medicines. The new guideline emphasizes the control of systolic blood pressure (SBP) and diastolic blood pressure (DBP) with comorbidity and age treatment cut-offs. Further recommendations were also introduced and designed to promote safer use of angiotensin receptor blockers (ARBs) and angiotensin-converting enzyme (ACE) inhibitors. Also, in individuals who are 60 y or above and do not present with any chronic kidney disease or diabetes, the goal of the blood pressure should be  $<150/90$  mmHg. In patients who are between 18 to 59 y without any diseased condition and in patients who are 60 y or older with co-morbidity, the new blood pressure goal should be  $<140/90$  mmHg. In both classes of patients, the first and later lines of treatment should be reduced to 4 types of antihypertensive agents, namely calcium channel blockers (CCBs), Angiotensin Receptor Blockers (ARBs), thiazide diuretics, and ACE inhibitors. Second or third-line alternatives should either be combinations or higher doses of CCBs, ARBs inhibitors, and thiazide diuretics. Alpha and Beta-blockers are also later line alternatives.

In patients of African origin without chronic kidney diseases, thiazide diuretics and CCBs should be administered instead of ACE inhibitors. ARBs and ACE inhibitors are recommended in all hypertensive individuals having chronic kidney disorders irrespective of racial background. These are recommended as first-line drugs or in addition to first-line medications. ARBs and ACE inhibitors are not encouraged to be administered concurrently. Thiazide diuretics and CCBs should be administered instead of ARBs and ACE inhibitors in hypertensive patients who are 75 y and above with a malfunctioning kidney [5].

Since Nigeria is an African country and indigenously blacks, the government adopted the JNC 8 Guidelines since it categorically emphasized on the use of antihypertensives, agents on blacks. The objective of this study was to determine the level of prescribers' adherence to the treatment guideline for the management of hypertension at the Lagos University Teaching Hospital.

## MATERIALS AND METHODS

This was a cross-sectional study that involved the retrospective abstraction of 3 mo of information from the medical records of out-patients at the Lagos University Teaching Hospital. The study was conducted at the Lagos University Teaching Hospital (LUTH). It is a tertiary healthcare institution that provides health care services not only to the university community but also to the entire country since referrals are often made from both the primary and secondary health care providers in the country.

### Sampling procedures

Using the Raosoft sample size calculator, the data of a total of 500 patients were used for the study. The systematic random sampling technique was used to retrieve every second folder, which met the eligibility criteria. There were 300 patients in Group A, and 200 in Group B. Group A were patients before the review.

### Eligibility criteria

The eligibility criteria of the study included the data of the patients who were diagnosed with essential hypertension and patients

receiving drug therapy before and after the review of the guidelines. Diabetic patients and patients with hypertension secondary to other underlying conditions were excluded from the study.

### Data collection

The medical records were examined in the presence of a third party who represented the hospital. Data collection was carried out in a secure place and at times, dictated by the usual practice of the hospital authorities. Neither patients' names nor other identifiers were entered into the assessment sheet. The data collection was solely about their hypertensive condition.

All the data and information were extracted and written down in proforma. These were designed to be destroyed as soon as the research was completed.

### Data analysis

The data were entered into Microsoft excel (2016), checked for correctness, and used for descriptive statistical analysis. Measures of central tendency such as frequency, percentage, mean, mode, and median were used to describe the collected data.

### Ethical considerations

Ethical approvals for the study were obtained from the University of Bradford (Ethics Application E.291) and the Lagos University Teaching Hospital (ADM/DCST/HREC/13 71). All the information abstracted from the medical records of the out-patients were treated with confidentiality.

## RESULTS AND DISCUSSION

Of the 300 patients whose records were used in Group A, 198 (66%) were males, while 136 (68%) of the 200 patients in Group B were of a similar gender. The modal age of the patients in group A was 45y while it was 40 y in group B. Other socio-demographic characteristics of the patients are as indicated in table 1.

**Table 1: Socio-demographic characteristics of the patients**

| Characteristics    | Group A (N=300) | Group B (N=200) |
|--------------------|-----------------|-----------------|
|                    | n (%)           | n (%)           |
| Age Range          |                 |                 |
| 30-39              | 38(13)          | 29(14)          |
| 40-49              | 77(26)          | 58(29)          |
| 50-59              | 89(30)          | 54(27)          |
| 60-69              | 63(21)          | 35(18)          |
| 70-79              | 26(8)           | 18(9)           |
| 80-89              | 7(2)            | 6(3)            |
| Mean (median)      | 53(55)          | 50(50)          |
| Min (max)          | 35(85)          | 30(85)          |
| Gender             |                 |                 |
| Male               | 198(66)         | 136(68)         |
| Female             | 102(34)         | 64(32)          |
| Weight             |                 |                 |
| 50-59              | 3(1)            | 4(2)            |
| 60-69              | 256(85)         | 167(83)         |
| 70-79              | 41(14)          | 29(15)          |
| Occupation         |                 |                 |
| Skilled            | 103(34)         | 71(36)          |
| Unskilled          | 197(66)         | 129(64)         |
| health-related     | 104(35)         | 70(35)          |
| Non-health related | 196(65)         | 130(65)         |

One (0.3%) patient in group A had a systolic blood pressure range of 130-139 mmHg while none has such systolic blood pressure range in group B. Furosemide was prescribed for 282 (94%) patients in group A, while it was prescribed for 197 (97%) patients in group B. The distribution of the systolic blood pressure ranges and prescribed drugs for patients in the two groups are shown in table 2.

Single antihypertensive was used for 183(61%) patients in Group A which none of the patients had a four-drug combination. For Group B, 67(33%) of the patients were prescribed two-drug Combination antihypertensives. In fig. 1, the number of drug combinations is shown for patients in Group A and Group B.

Table 2: Clinical characteristics of the patients in Group A and B

| Characteristics  | Group A (N=300) | Group B (N=200) |
|------------------|-----------------|-----------------|
|                  | n (%)           | n (%)           |
| BP Range (mmHg)  |                 |                 |
| 130-139          | 1(0.3)          | -               |
| 140-149          | 63(21)          | 41(20)          |
| 150-159          | 64(21)          | 43(22)          |
| 160-169          | 61(20)          | 40(20)          |
| 170-179          | 61(20)          | 42(21)          |
| 180-189          | 50(17.7)        | 34(17)          |
| Drugs prescribed | (N=445)         | (N=450)         |
| Furosemide       | 282(94)         | 197(97)         |
| Atenolol         | 61(20)          | 59(30)          |
| Nifedipine       | 50(16)          | 81(40)          |
| Propranolol      | 44(15)          | 75(37)          |
| Captopril        | 6(2)            | 16(8)           |
| Clonidine        | 1(0.3)          | 2(1)            |
| Bendrothiazide   | 1(0.3)          | 1(0.5)          |
| Methyldopa       | -               | 19(9.5)         |

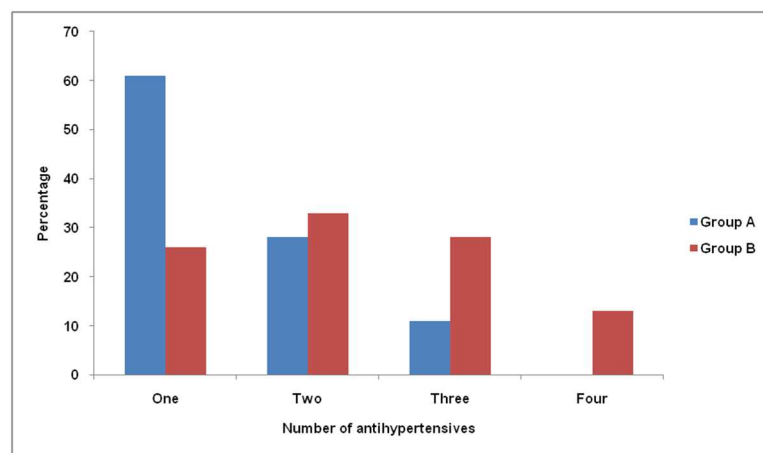


Fig. 1: Number of antihypertensives per prescription

## DISCUSSION

This study was conducted at the Lagos Teaching Hospital to determine the level of prescribers' adherence to the World Health Organisation/International Society for Hypertension (WHO/ISH) hypertension treatment guidelines. Two groups were used for the study. Group A was patients before the guideline review, while group B was those after the guideline review. The two groups had more male patients than females. The modal age of group A patients was slightly higher than those of group B, although the difference was not significant.

Furosemide was the most prescribed antihypertensive for both groups. Many of the patients in both groups had a single antihypertensive prescribed for their use. Furosemide and atenolol were the predominantly co-prescribed drugs before the guideline review. The prescription changed to furosemide and Nifedipine co-prescription in compliance with the guideline review. In both instances, prescribers of antihypertensives in the studied hospital complied with the treatment guidelines before and after the review.

The sociodemographic characteristics reported in this study seem to be unique compared to those of similar studies. In a survey researched in Nigeria by Odili *et al.* (2008), the age range, weight range, occupation, and health-related or non-health-related characteristics of the patients were categorically defined [4]. In that study, 501 case notes were retrieved for evaluation between a specified period and were assessed for adherence to the treatment guidelines. In the study, the prevalence of hypertension was highest in the second category. More women were affected with diagnostic mean SBP and DBP of 163.7±21.9 mmHg and 100.1±13.2 mmHg, respectively. With antihypertensive treatment, the values of the SBP and DBP for females reduced to 132.3±11.5 mmHg and 83.2±7.5 mmHg while those of the

male patients were 131.8±11.6 mmHg and 84.3±7.5 mmHg, respectively. It is essential to mention that unlike in this present study, the patients were assessed with co-morbidities [4].

Another study conducted in Nigeria by Ale *et al.* (2017) focused on the awareness of hypertension treatment guidelines among primary-care prescribers and its relationship to hypertension diagnosis [6]. In the study, the primary care physicians (PCP) were categorized into two groups of hypertension guideline aware (GA) and unaware (GU). Anonymous self-administered questionnaires were employed, which is strikingly different from this study. The study concluded that there is a knowledge gap between guideline recommendations and hypertension care in Nigeria, which is further increased by PCP's awareness of the guidelines. Consequently, popularizing hypertension treatment guidelines among PCP's significantly improves hypertension care and reduces the upsurge of the disease [6].

In Zimbabwe, research by Basopo *et al.* (2017) assessed the prescribing practices for hypertensive patients in the private sector to verify whether it followed the national treatment guidelines. The majority of the populace in Zimbabwe seek medical care from the private sector. In the research, they reviewed the hypertension prescription claims made by a private insurance company within a specific period.

The last claim made in the year based on the prescription was used on the assumption that is represented the patients' current treatment. The prescription information was analyzed by comparing the drugs prescribed to those recommended in Zimbabwe's 7<sup>th</sup> Essential medicines list and standard treatment guidelines of 2015. Slightly over a thousand prescriptions were investigated, and most patients were either placed on a single or double therapy.

ACEI/Angiotensin receptor blockers were the most prescribed agents (63 times), unlike in this study that had diuretics. Only 358 (35%) prescriptions complied with guidelines, which indicates poor compliance [7]. The findings of the study are similar to those found in other countries, as was in the present study [8, 9].

A similar study that was conducted in India by Varakanthan *et al.* (2018) had all the patients higher than 25 y of age. Five hundred and fifty hypertensive patients were used for the retrospective cross-sectional study. In the study which was researched at a tertiary care government hospital, it was observed that there was a significant rise in the use of single therapy (from 56.9% to 82.5%,  $p < 0.01$ ).

Also, the use of Beta Blocker ( $\beta\text{B}$ ) moved from the first to the last position following JNC8 guidance. The thiazide diuretics were the least prescribed medicine, thus deviating from the JNC guidelines. They concluded that the combination therapy regimen must be followed as stipulated in the guidelines for the achievement of appropriate blood pressure goals [10]. It should, however, be noted that combination therapies predispose patients to drug therapy problems, especially drug-drug interactions [11, 12].

Also, in India, another prospective observational study was researched among 101 patients from different inpatient wards who were above the age of eighteen. The study also had patients with comorbidities. Calcium channel blocker was the most prescribed drug, while a few of the patients (15.84%) were placed on a combination regimen. The study also concluded that there was 50% adherence, which could be improved upon to enhance treatment outcomes [13].

Sessions *et al.* (2015) also evaluated the adherence to national guidelines for the treatment of hypertensive individuals who are of Africa-America descent. It was a descriptive pre-experimental quantitative study. Electronic medical records were investigated, and data were obtained from only 62 records of information. Blood pressure readings, laboratory studies, and other relevant data were collected. At the end of the study, the overall provider adherence was adjudged to be very good (75%) [14].

Heneghan *et al.* (2008) researched general practitioners' awareness of present hypertension treatment guidelines and the implementation in their clinical practices. It was a questionnaire-based survey via the internet, unlike this study that manually abstracted medical information was used. In the study, the awareness of the recommendation was high, but specified limitations and actions were required to enhance application and the guidelines that differ from the clinical effects. They concluded that increased adherence requires a dynamic workforce that matches the scientific evidence underlining the guidance [15]. Milchak *et al.* (2004), in their literature on the adherence to practice guidelines for the treatment of hypertension, stated that most of the studies have methodological limitations that hindered the physician's adherence [16].

In cross-sectional research conducted in Malaysia by Ahmad *et al.* (2013) had 650 established hypertensive outpatients. The prescriptions were classified as compliant or non-compliant. The blood pressure (BP) recorded for the patients on the second visit was compared with the first visit. In the study, three hundred and forty-nine (67.1%) patients were guideline complaints. This implies that there was a significant level of adherence to treatment guidelines, which led to better management of hypertension [17].

This study did not classify the classes of antihypertensive agents. Consequently, it is an apparent limitation. Another limitation is that the study is a one center study. However, being a teaching hospital, the research output could be dependable. Since the guidelines were reviewed in 2005, it's a limitation. However, the research gives an idea of a change of prescription pattern, which ultimately affects the adherence to the hypertension treatment guidelines. It also points to the need for pharmacists-led intervention in drug management of hypertension, as proven by an Indian study [18].

## CONCLUSION

Prescribers at the Lagos University Teaching Hospital substantially complied with WHO/ISH hypertension treatment guidelines before

and after the 2005 review. Before the review, Furosemide alone, in combination with atenolol, were the most commonly prescribed antihypertensives. Furosemide, with or without Nifedipine is the antihypertensives of choice after the review in the management of hypertension. Therefore, it is now recommended that continuous sensitization should be conducted to sustain and improve the observed practice.

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Nil

## AUTHORS CONTRIBUTIONS

Isaac Chijioke Ibezim and Ian Naylor conceptualized the study, modalities of data collection and analysis. Isaac Chijioke Ibezim and Abdulmuminu Isah drafted the manuscript. Nneka Igboeli and Abdulmuminu Isah revised the manuscript. All authors approved the manuscript for publication.

## CONFLICT OF INTERESTS

The authors declared no conflict of interest.

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