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ANTIHYPERTENSIVE PRESCRIPTION PATTERN AND TIME TRENDS FOR NEWLY DIAGNOSED UNCOMPLICATED HYPERTENSIVE PATIENTS

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ABSTRACT

Hypertension is the most common modifiable risk factor for cardiovascular diseases (CVD), stroke and renal failure. It is the second leading cause of chronic kidney disease (CKD). Useful information can be obtained from the knowledge of existing prescription patterns in order to improve clinical practice. This study was designed to determine the prescription patterns and time trends for antihypertensive in newly diagnosed cases of uncomplicated hypertension in the University of Uyo Teaching Hospital (UUTH) and St Luke's Hospital Anua (SLHA) both in Uyo, and to compare these with the current clinical prescription guidelines. A retrospective study was conducted using patients case files. A total of 3,201 patients of age 20 years and above with uncomplicated hypertension cases were enrolled. Appropriate statistical test was employed; student t-test was used to compare the prescription pattern and time trends of antihypertensive medications and significant level was set at 5% ($p<0.05$). Prescriptions pattern for newly-diagnosed cases of uncomplicated hypertension in SLHA from January 2017 to December 2019 showed that single antihypertensive drug therapy (1022, n =2,350; 43.50%) was mostly practiced over others. Likewise prescriptions pattern for newly-diagnosed cases of uncomplicated hypertension in UUTH from January 2017 to December 2019 showed that monotherapy (309, n = 606; 50%) was mostly practiced over others. The results shows that in both hospitals, prescribers complied with the guidelines for treatment of newly diagnosed hypertension.

KEYWORDS: Prescription, Pattern, Newly Diagnosed, Uncomplicated, Hypertensive Patients.

INTRODUCTION

Hypertension is the most common modifiable risk factor for cardiovascular diseases (CVD), stroke and renal failure. [1] It is the second leading cause of chronic kidney disease (CKD). It is estimated that more than one billion adults are hypertensive worldwide and this figure is projected to increase to one billion, five hundred and sixty million by the year 2025, which is an increase of 60% from the year 2000. [2] Cardiovascular diseases and hypertension account for the loss of 4% gross domestic product for low and middle income countries annually which amounts to five hundred billion dollars.[2] Clinical evidence suggests that lowering blood pressure (BP) with antihypertensive drugs reduces the risk of myocardial infarction, stroke, heart failure, revascularization procedures and end-stage renal diseases in hypertensive patients.[3]

The increasing prevalence of hypertension has been attributed to population growth, ageing and behavioural risk factors, such as unhealthy diet, excess use of alcohol, sedentary lifestyle, obesity, and exposure to persistent stress. A whopping nine million, four hundred thousand deaths occur worldwide every year because of hypertension with it being responsible for about 50% of mortality due to heart disease and stroke.[2,4] Epidemiological studies demonstrated that prevalence of hypertension is increasing rapidly in India, varying from 4 -15% in urban and 2 – 8% in rural population.[5]

Several guidelines have been developed worldwide for the management of hypertension, and these serve as reference standards for clinical practitioners. However, many clinicians practice their own prescribing pattern in treating hypertensive patients according to their clinical experience. Primary care physicians need to be empowered in appropriate and evidence-based management of hypertension. A review of these prescribing patterns and guideline-based use of antihypertensive medications can give better insights into the concept of personalized, yet cost-effective pharmacological management of hypertension.[6]

Nigeria is the most populated African country, and the prevalence of hypertension in the country highly contributes to the overall burden in Africa.[7] As with all diseases, treatment guidelines are very essential to the clinicians, by helping them deliver their services

dexterously, as well as improving the disease outcome and patients' quality of life (QOL).[8] Despite these guidelines and evidence showing that hypertension is a major public health concern, many clinicians fail to assess blood pressure routinely, and in those with a diagnosis of hypertension, do not start treatment or titrate the dosage of the drugs effectively.[9] In the management of the disease, certain factors account for resistance or therapeutic failure, further increasing the disease burden and associated outcomes. Non-compliance or non-adherence to prescribed antihypertensive medication is a common factor seen among patients. However, physician's non-compliance with current treatment guidelines also potentiates treatment failure in some patients. Failure to adhere to current treatment guidelines by the prescriber provokes therapeutics failure and drug toxicity in patients.[10,11] There is need of data on the prescription patterns of physicians for the disease condition in Akwa Ibom state. Therefore, it is essential that the prescription pattern of practitioners in the study area be assessed so as to enhance adherence to current treatment guidelines among physicians which will improve treatment outcome among patients diagnosed with hypertension.

Antihypertensive therapy is usually an individualized application of the most effective intervention that addresses health, financing efficiencies and also reflects the quality of training of the physicians for adhering to the guidelines. [7] With the economic status of its citizens, and increasing healthcare budget, it is important for health practitioners to prescribe drugs according to guidelines to minimize cost, the risk of complications from non compliance to medication and adverse effects from unneeded prescription patterns.[11,12] Studies such as this will help in maintaining adherence to prescribing guidelines, It will also aid in decision making (i.e., the decision to include or exclude a particular drug from the regimen), and creation of clinical guidelines for physicians that will assist them in prescribing the most efficient drug. [8,10,13] This research was therefore designed to determine the antihypertensive prescription patterns of clinicians practicing in a secondary and tertiary health institutions in the Uyo Metropolis, and the time trends for newly diagnosed uncomplicated hypertension patient there and to compare these with current clinical guidelines.

MATERIALS AND METHODS

Study Design: This study was retrospective, male and female patient files of age twenty to eighty-five years from the Record Department of the Hospitals, between January 2017 and December 2019 were obtained. Details on the gender and date of birth of the patients, the date of prescription, generic names of drugs, drug dosages/duration and costs for each prescription are recorded in the patients' files. Patients initially identified were newly diagnosed with essential hypertension that were being treated for this condition, and had received their first antihypertensive medication between 1st January 2017 and 31st December 2019. In order to verify that a case was a new one, a period of at least one year was required (January to December of 2016) without any treatment and, or diagnosis relating to hypertension (this was before the initial diagnosis).

To prevent potential confounding by co-morbidities in the prescription patterns of antihypertensive agents at the different clinical facilities, patients diagnosed with suspected diabetes mellitus, ischemic heart disease, diseases of pulmonary circulation, other forms of heart diseases (including dysrhythmia and heart failure), stroke or renal diseases were excluded from the sample. In order to ensure adherence to these criteria, any of the above diagnoses may not have appeared in any hospitalization file prior to the patient having been diagnosed as hypertensive, and the diagnoses may not have appeared more than three times in ambulatory outpatient files. We discarded those diagnoses which appear only once or twice in ambulatory to allow for further diagnostic examination. This was addressed by ensuring that only those without any complication qualified for this study.

Study Setting and Location: This work was carried out in a tertiary health facility, the University of Uyo Teaching Hospital (UUTH), and a secondary health facility, St Luke's hospital Anua, Uyo. The University of Uyo Teaching Hospital is a 500 bed hospital which gained the status of a teaching hospital in 2007 and records 6,000 – 7,000 patients admission per year,[14] while St Luke's Hospital is a 300 bed hospital and records 3000 – 5000 patient admission per year. Both health facilities are located in Uyo Metropolis, Akwa Ibom State in the south-south geopolitical zone of Nigeria. They serve a population of about 4,000,000 people both within and outside the state. [14]

Study Population and Duration: The study was carried out among newly diagnosed antihypertensive patients in these health facilities and lasted for over three months.

Data Collection: All antihypertensive drug prescription records from ambulatory care and prescriptions dispensed at the hospital pharmacies were retrieved and analysed for our sample of newly-diagnosed patients. Patients were stratified by gender and age, with age being split into two sub-groups: the younger group 20–54 years of age and the older group 55-85 years.

The clinical facilities were classified into two types, secondary and tertiary health care facilities based on the level of medical care provided and the size of the institution. This was addressed by ensuring that the data collection in each facility was based on the number of uncomplicated hypertensive cases diagnosed in each of the facilities.

Antihypertensive drugs was categorized according to the 1999 World Health Organization-International Society

Hypertension Guidelines for the Management of Hypertension,[15] and the eight Report of the Joint National Committee on Prevention, Detection, Evaluation and Treatment of High Blood Pressure.[16] Six major categories of antihypertensive drugs generally were available, including angiotensin-converting enzyme (ACE) inhibitors, angiotensin receptor blockers (ARBs), beta-blockers, calcium channel blockers (CCBs), diuretics, and others (all other antihypertensive classes including alpha-blockers),[17]

Prescriptions for a chronic disease in Nigeria, such as hypertension, most frequently involves the prescribing of drugs for 28 - 90-days period, which would allow the patient to visit a Doctor every one to three months. Since each prescription may have contained different combinations of drugs and durations of medication, analysis of the data was undertaken using the prescription rate, calculated as the number of prescriptions containing a specific antihypertensive agent divided by the total number of prescriptions. A comparison of the prescription time trend was undertaken for each year, beginning with the first antihypertensive prescription.

Sample Size: A convenience sampling method was used to select all patient case file which met the inclusion criteria.

Inclusion and Exclusion Criteria: All male and female patients (20 years and above) newly diagnosed of all classes of hypertension in these health facilities were included. Hypertensive patients with other comorbidities as well as hypertensive patients already on maintenance antihypertensive agent were excluded from the study.

Statistical Analysis: Data were analysed using Instat Graph pad (Graphpad software Inc, San Diego, USA). Data are expressed as mean ± standard deviation, and $p < 0.05$ was considered as statistically significant. Appropriate statistical test was employed; Student's t-test was used to compare the prescription pattern and rates of antihypertensive medicines from the two hospitals with significance level set at 5%.

Ethical Issues: All necessary ethical considerations as regards the use of human subjects in health research were satisfactorily met. The research was conducted in strict compliance to the principles of beneficence, non-maleficence, autonomy and justice. Moreover, ethical approval (UUTH/AD/S/96/VOL.XXI/469) was obtained from the University of Uyo Teaching Hospital Health and Research Ethics Committee (Appendix I).

RESULTS AND DISCUSSION

Demographic Profile: In this study, a total of 3,201 patients of age of 20 years and above with uncomplicated hypertension cases were enrolled. Tables 1 and 2 contain information on patients who had received their initial dose of antihypertensive drugs for essential hypertension between 1st.January 2017 and 31st. December 2019 in St. Luke's Hospital, Anua (SLHA) and University of Uyo Teaching Hospital (UUTH) respectively. A total sample of 2,601 patients (1,005 males, 38.63% and 1,596 females, 61.36%) were enrolled from St. Luke's Hospital, Anua, while 606 patients (249 males, 41.08% and 357 females, 58.92%) were enrolled from the UUTH. In SLHA, the mean age for the two categories of patients studied were 45.54±9.44 (29-55years) and 65.12±8.28 (57-85years). From the 2601 patients in SLHA, 1,597 were married, 870 single, widows were 116 and 18 were divorced. Retirees were 1,183, public servant 1,090 and self-employed 330 (Table 1).

In UUTH, the mean age for the two categories of patients studied were 43.14±6.45 (30-52years) and 65.37±12.02 (55-84years). Among the 606 patients in UUTH, 380 were married, 182 single, widows were 49 and 13 were divorced. From these numbers, retirees were 250, public servant 260 and self-employed 96 (Table 2).

Table 1: Demographic data and cases of newly diagnosed uncomplicated hypertension patients in St Luke's Hospital, Anua.

Items	2017			2018			2019			Gross Total
	Male	Female	Total	Male	Female	Total	Male	Female	Total	
Gender	408	558	966	363	532	895	234	506	740	2601
Percentage	42.23	57.76		40.55	59.44		31.62	19.45		Male-38.63% Female-61.36%
Mean age Age of patients<55 years	38.14±10.66 (29-55 yrs)	48.52±11.22 (35-55 yrs)		44.35±9.44 (39-51 yrs)	48.4±9.12 (36-53 yrs)		46.23±8.96 (38-55 yrs)	48.4±15.69 (39-55 yrs)		(45.54±9.44) (29-55yrs)
Mean Age of patients>55yrs	64.54±12.55 (59-81 yrs)	70.23±15.16 (62-87 yrs)		69.70±8.67 (58-83 yrs)	71.2±10.23 (61-83 yrs)		67.84±9.15 (59-85 yrs)	66.72±12.16 (57-85 yrs)		65.12±8.28 (57-87yrs)
Marital Status	Married-226 Single-173 Widow- 9 Divorced-0	Married-294 Single-204 Widow- 56 Divorced-4		Married-236 Single-98 Widow- 21 Divorced-8	Married-352 Single-178 Widow- 2 Divorced-0		Married-148 Single-83 Widow- 3 Divorced-0	Married-341 Single-134 Widow- 25 Divorced-6		Married- 1597 Single-870 Widow- 116 Divorced-18
Occupation	Retirees-181 Public	Retirees-236 Public		Retirees-193 Public	Retirees-268 Public		Retirees-107 Public	Retirees-198 Public		Retirees- 1183 Public servant-1090

	servant-205 Self-employed-22	servant-189 Self-employed-133		servant-142 Self-employed-30	servant-197 Self-employed-67		servant-116 Self-employed-11	servant-241 Self-employed-67		Self-employed-330
Number of new cases of hypertension	408	558`	966	363	532	895	234	506	740	2601

Table 2: Demographic data and cases of newly diagnosed uncomplicated hypertension patients in UUTH.

Items	2017			2018			2019			Gross Total
	Male	Female	Total	Male	Female	Total	Male	Female	Total	
Gender	82	120	202	80	122	202	87	115	202	606
Percentage	40.59	59.40		39.60	60.39		43.06	56.93		Male-41.08% Female-58.92%
Mean age of patients<55yrs	36.7±9.32 18-55yrs	41.23±12.35 (21- 55 yrs)		40.52±10.55 (23-55 yrs)	35.23±15.64 (20-52 yrs)		45.21±5.44 (22-51 yrs)	50.14±8.43 (22-53 yrs)		43.14±6.45 (25-55yrs)
Mean Age of patients>55yrs	68.40±15.69 (59-85 yrs)	60.23±12.35 (56-81 yrs)		65.7±18.67 (55-83 yrs)	71.2±10.23 (61-83 yrs)		70.23±12.22 (62-81 yrs)	68.25±10.46 (58-84 yrs)		65.37±12.02 (55-84 yrs)
Marital Status	Married- 44 Single-30 Widow- 5 Divorced-1	Married- 82 Single-38 Widow- 15 Divorced-5		Married- 53 Single-25 Widow- 2 Divorced-0	Married- 68 Single-32 Widow- 17 Divorced-5		Married- 59 Single-22 Widow- 4 Divorced-2	Married- 74 Single-35 Widow- 6 Divorced-0		Married- 380 Single-182 Widow- 49 Divorced-13
Occupation	Retirees- 5 Public servant-32 Self-employed-15	Retirees- 46 Public servant-53 Self-employed-21		Retirees- 36 Public servant-40 Self-employed-4	Retirees- 6 Public servant-45 Self-emplo-yed-21		Retirees- 44 Public servant-32 Self-employed-11	Retirees- 33 Public servant-58 Self-emplo-yed-24		Retirees- 250 Public servant-260 Self-employed-96
Number of new cases of hypertension	82	120`	202	80	122	202	87	115	202	606

Antihypertensive Prescriptions Pattern and Time Trends among Newly Diagnosed Uncomplicated Hypertension Patients in St. Luke's Hospital, Anua

The prescription pattern of antihypertensive therapies for 2017 to 2019 in St. Luke's Hospital, Anua is as shown in Table 3. Prescriptions pattern for newly-diagnosed cases of uncomplicated hypertension in SLHA for 2017 to 2019 showed that single antihypertensive drug therapy (n = 2,350; 43.50%) was mostly practiced over others, with male (45.37%) and older patients (62.29%) receiving more mono-therapies. However, greater number of female (48.93%) and younger patients (38.52%) were given two-drug therapy. Three-drug therapy was common in male (7.16%) and younger patients (8.45%) during the period (Table 3). The percentage of mono-therapy treatments during the period was greater than other therapy approaches.

The most frequently prescribed antihypertensive drugs (Table 4) ranked in order of prescribing frequency were as follows: CCBs (39.99%), ACEIs (22.35%), ARB (20.37%), HCTZ-10.61%, and beta-blockers (6.65%). The total number of prescriptions for the different categories of antihypertensive drugs as provided in Table 4 shows that the most frequently prescribed antihypertensive agents were CCBs (n = 1628; 48.75%), ACE inhibitors as the second most frequently prescribed, followed by ARBs, diuretics, and beta blockers.

Table 3: Prescription patterns of antihypertensive therapies for newly diagnosed uncomplicated hypertension patients in St Luke's Hospital, Anua.

Treatment Regimens							
Variables	**Monotherapy**		**Two-drug combinations**		**Three-drug combination**		**Total number of prescriptions**
	No.	**%**	**No**	**%**	**No.**	**%**	
Patient gender							
Male	456	45.37	477	47.46	72	7.16	1005
Female	719	45.05	781	48.93	96	6.01	1596
Patient age (Years)							
<55	439	53.01	319	38.52	70	8.45	828
>55	736	62.29	939	34.14	98	3.56	1743
Total no.	2350	45.44	2516	48.65	336	6.50	5172

Table 4: Distribution of antihypertensive drugs for newly diagnosed uncomplicated hypertension patients, by gender and age in St Luke's Hospital, Anua.

CLASS OF DRUGS											Total no. of prescriptions
Variables	CCB		ACEI		ARB		HCTZ		Beta blockers		
	No.	%	No	%	No.	%	No	%	No	%	
Patient gender											
Male	400	36.00	263	23.67	212	19.08	148	13.32	88	7.92	1111
Female	711	42.65	358	21.47	354	21.23	147	8.81	97	5.81	1667
Patient age (Years)											
<55	319	34.97	225	24.67	178	19.51	106	11.62	84	9.21	912
>55	792	42.44	396	21.22	388	20.79	189	10.12	101	5.41	1866
Total no.	2222	39.99	1242	22.35	1132	20.37	590	10.61	370	6.66	5556

Monotherapies for New Cases of Uncomplicated Hypertension in St. Luke's Hospital, Anua

Among all of the mono-therapy prescriptions in SLHA, the most frequently prescribed antihypertensive agents were CCBs (n = 1,628; 48.75%) and ACE inhibitors (n = 143; 18.77%). Younger patients (aged below 55 years) (53.81%) and female patients (50.85%) were treated with CCBs more often than older patients and males. ACE inhibitors were prescribed more to males (21.08%) and younger patients (23.09%) (Table 5). The prescription rates for HCTZ and ARBs were higher among men and older patients, while the prescription rates for beta blockers were higher among women (Table 5).

It was observed in the study that during the period under study (2017 to 2019), the prescription rates of mono-therapy declined from 53.51% in 2017 to 27.29% in 2019, while there was an increase in prescription rates of two-drug therapy from 40.78% in 2017 to 67.02% in 2019. There was no significant change in the rate of three-drug therapy within the period (Figure 1). There was a progressive increase in the rates of prescription of CCBs from 2017 (32.12%) to 2019 (44.56%) (Figure 2). Increased prescription rates of beta blockers and HCTZ were also observed within the period with beta blockers having the rate of 3.01% in 2017 and 10.62% in 2019, while HCTZ had a rate of 5.56% in 2017 and 9.29% in 2019 (Figure 2). However, there were decreases in the rates of prescription of ARBs and ACE inhibitors within the same period (Figure 2).

Table 5: Distribution of monotherapy antihypertensive drug prescriptions for newly diagnosed uncomplicated hypertension patients St Luke's Hospital, Anua.

CLASS OF DRUGS											Total no. of prescriptions
Variables	CCB		ACEI		ARB		HCTZ		Beta blockers		
	No.	%	No	%	No.	%	No	%	No	%	
Male	311	45.80	143	21.06	122	17.96	83	12.22	20	.94	679
Female	503	50.85	169	17.08	171	17.29	104	10.51	42	4.24	989
Age (yrs)											
<55	275	53.81	118	23.09	49	9.58	51	9.98	18	3.52	511
>55	539	46.46	197	16.98	244	21.03	136	11.72	44	3.79	1160
Total no.	1628	48.75	627	18.77	586	17.55	374	6.94	124	6.94	3339

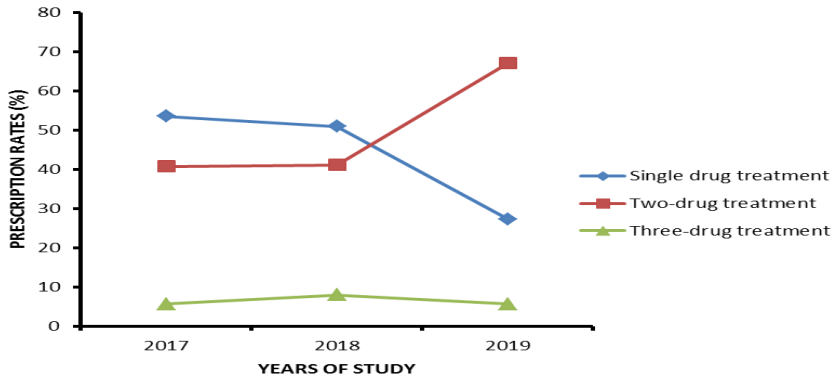

Figure 1: Prescription pattern time trends for combination of mono, two and three-drug treatment therapies in St Luke's Hospital Anua.

Antihypertensive Prescriptions among Newly Diagnosed Uncomplicated Hypertension Patients in UUTH

The prescription pattern of antihypertensive therapies for 2017-2019 in University of Uyo Teaching Hospital is as shown in (Table 6). Prescriptions pattern for newly-diagnosed cases of uncomplicated hypertension in UUTH for 2017 to 2019 showed that mono-therapy (n = 606; 50%) was mostly practiced over others, with women (53.52%) and younger patients (51.08%) receiving more monotherapies. However, greater percentage of men (36.25%) and younger patients (33.61%) were given two-drug therapy. Three-drug therapy was mostly prescribed for in men (18.72%) and younger patients (18.75%) during the period (Table 6).

The percentage of mono-therapy treatments during the period was greater than other therapy approaches. The most frequently prescribed antihypertensive drugs (Table 7) ranked in order of prescribing frequency were as follows: CCBs (37.20%), HCTZ (24.68%), ACEIs (18.87%), ARB (11.07%), and beta-blockers (8.16%). The total number of prescriptions for the different categories of antihypertensive drugs as provided in Table 7, shows that the most frequently prescribed antihypertensive agents were CCBs (n = 410; 37.20 %), with diuretics as the second most frequently prescribed, followed by ACE inhibitors, ARBs, and beta blockers.

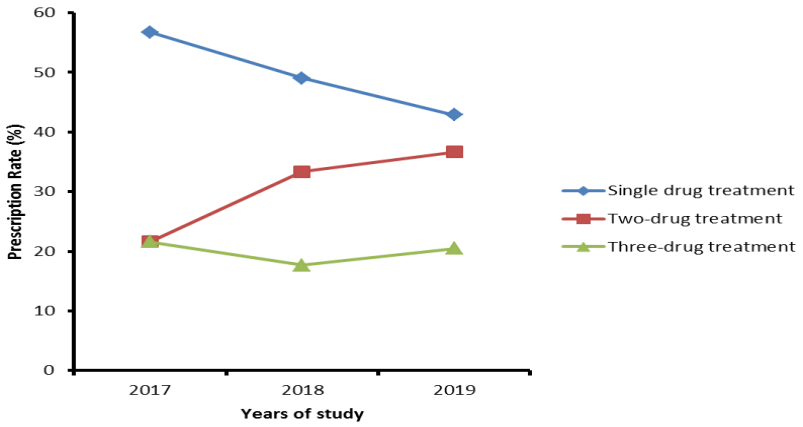

Figure 2: Prescription pattern time trends for combination of mono, two and three-drug treatment therapies in University of Uyo Teaching Hospital.

Table 6: Prescription patterns of antihypertensive therapies for newly diagnosed uncomplicated hypertension patients in University of Uyo Teaching Hospital.

TREATMENT REGIMENS							
Variables	**Monotherapy**		**Two-drug combinations**		**Three-drug combination**	**Total number of prescriptions**	
	No.	**%**	**No**	**%**	**No.**	**%**	
Gender							
Male	113	45.01	91	36.25	47	18.72	251
Female	190	53.52	100	28.16	65	18.30	355
Age (yrs)							
<55	188	51.08	111	30.16	69	18.75	368
>55	115	48.31	80	33.61	43	18.06	238
Total no.	606	50.0	382	31.51	224	18.48	1212

Table 7: Distribution of antihypertensive drugs for newly diagnosed uncomplicated hypertension patients, by gender and age in University of Uyo Teaching Hospital.

CLASS OF DRUGS											Total no. of prescriptions
Variables	**CCB**		**ACEI**		**ARB**		**HCTZ**		**Beta blockers**		
	No.	**%**	**No**	**%**	**No.**	**%**	**No**	**%**	**No**	**%**	
Gender											
Male	120	48.97	45	18.36	20	8.16	55	22.44	5	2.04	245
Female	85	27.77	59	19.28	41	13.39	81	26.47	40	13.07	306
Age (yrs)											
<55	137	39.36	61	17.52	35	10.05	84	24.13	31	8.90	348
>55	68	33.49	43	21.18	26	12.80	52	25.61	14	2.58	203
Total no.	410	37.20	208	18.87	122	11.07	272	24.68	90	8.16	1102

Monotherapies for New Cases of Uncomplicated Hypertension in UUTH

Among all of the monotherapy prescriptions in UUTH, the most frequently prescribed antihypertensive agents were CCBs (n = 254; 45.84%) and HCTZ (n = 128; 23.10%). Younger patients (aged below 55 years) (60.0%) and male patients (64.06%) were treated with CCBs more often than older patients and women. Diuretics were prescribed more to females (29.33%) and older patients (30.76%)(Table 4.8). The prescription rates for ACE inhibitors, ARBs and beta blockers were higher among women and older patients (>55 years).

The prescription rates of mono-therapy were found to have declined during the period (2017 to 2019) from 56.78% in 2017 to 42.85% in 2019, while the prescription rate of two-drug therapy was observed to have increased within the same period from 21.60% in 2017 to 36.66% in 2019. However, the rate of three drug therapy was observed to have slightly declined from 2017 to 2019 (Figure 3).

There was a progressive increase in the rates of prescription of CCBs from 2017 (43.65%) to 2019 (50.24%)(Figure 4). Slight increases in prescription rates of beta blockers and HCTZ were also observed within the period with beta blockers having the rate of 4.06% in 2017 and 5.36% in 2019, while HCTZ had a rate of 20.81% in 2017 and 22.43% in 2019 (Figure 4). However, there were notable decreases in the rates of prescription of ARBs and ACE inhibitors within the same period (Figure 4).

Table 8: Distribution of monotherapy antihypertensive drug prescriptions for newly diagnosed uncomplicated hypertension patients in University of Uyo Teaching Hospital.

	CLASS OF DRUGS										
Variable	**CCB**		**ACEI**		**ARB**		**Diuretics**		**β-blockers**		**Total prescriptions**
	No.	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	
Gender											
Male	82	64.06	13	10.15	11	8.59	20	15.62	2	1.56	128
Female	45	30.0	28	18.66	18	12.00	44	29.33	15	10.00	150
Age (yrs)											
<55	72	60.0	18	15.0	8	6.66	16	13.33	6	5.00	120
>55	55	35.25	23	14.74	21	13.46	48	30.76	9	5.76	156
Total no.	254	45.84	82	14.80	58	10.46	128	23.10	32	5.77	554

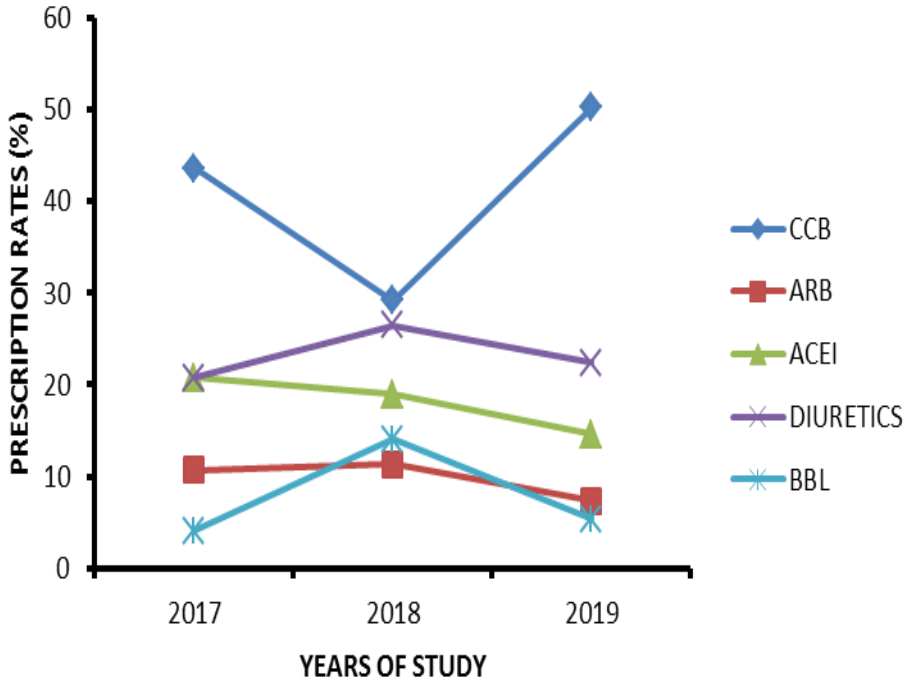

Figure 3: Prescription distribution time trends for antihypertensive agents in University of Uyo Teaching Hospital.

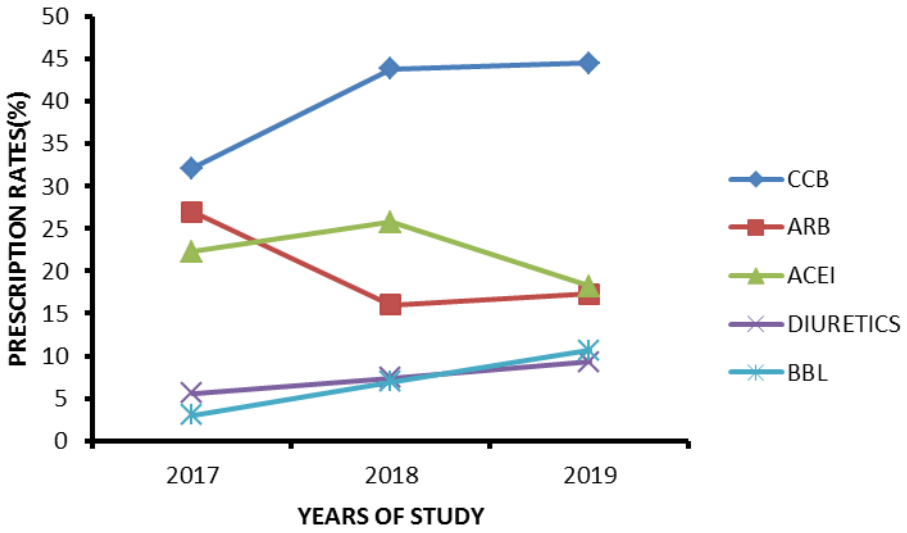

Figure 4: Prescription distribution time trends for antihypertensive agents in St. Luke's Hospital, Anua.

DISCUSSION

Hypertension is the most common modifiable risk factor for cardiovascular diseases (CVD), stroke and renal failure.[1] It is the second leading cause of chronic kidney disease (CKD). Several guidelines have been developed worldwide for the management of hypertension, and these serve as reference standards for clinical practitioners. However, many clinicians practice their own prescribing pattern in treating hypertensive patients according to their clinical experiences.[18,19,20]

The Eighth Joint National Committee (JNC 8) in 2014 released evidence-based recommendations on treatment thresholds, goals, and medications in the management of hypertension in adults. According to JNC 8, in the general population of adults 60 years and above, pharmacologic treatment should be initiated when the systolic pressure is 150 mm Hg or higher, or when the diastolic pressure is 90 mm Hg or higher. Patients should be treated to a target systolic pressure of less than 150 mm Hg and a target diastolic pressure of less than 90 mm Hg. Treatment does not need to be adjusted if it results in a systolic pressure lower than 140 mm Hg, as long as it is not associated with adverse effects on health or quality of life. In the general population younger than 60 years, pharmacologic treatment should be initiated when the systolic pressure is 140 mm Hg or higher, or when the diastolic pressure is 90 mm Hg or higher. The target systolic pressure in this population is less than 140 mm Hg, and the target diastolic pressure is less than 90 mm Hg.[21]

This study was designed to determine the antihypertensive medication prescription pattern and time trends for newly- diagnosed uncomplicated hypertension patients in a secondary (St. Luke's Hospital, Anua) and a tertiary health institution (University of Uyo Teaching Hospital) in Uyo, Akwa Ibom State, and to compare these with current clinical guidelines so as to confirm adherence to these guidelines or otherwise.

In this study, prescriptions pattern for newly-diagnosed cases of uncomplicated hypertension in SLHA from January 2017- December 2019 showed that single antihypertensive drug therapy (n = 2,350; 43.50%) was mostly practiced over others, with male (45.37%) and older patients (62.29%) receiving more mono-therapies. In UUTH, similar prescription pattern was also found for newly-diagnosed cases of uncomplicated hypertension for 2017-2019. Mono-therapy (n = 606; 50.00%) was mostly practiced over others, with women (53.52%) and younger patients (51.08%) receiving more mono-therapies. This pattern probably shows adherence to the laid down guidelines in the two health institutions in Uyo and consistent with others studies in Nigeria.[20] However, It was observed also that during the period under study (2017 to 2019), the prescription rates of mono-therapy in SLHA declined from 53.51 in 2017 to 27.29% in 2019, while there was an increase in prescription rates of two-drug therapies from 40.78% in 2017 to 67.02% in 2019. Similarly, in UUTH, the prescription rates of mono-therapies were found to have declined during the period (2017-2019) from 56.78% in 2017 to 42.85% in 2019, while the prescription rates of two-drug therapy was observed to have increased within the same period from 21.60% in 2017 to 36.66% in 2019. The declined in pattern and rates of mono-therapies in the two health institutions must have been aimed at achieving target BP control as was observed by Al-Drabah et al., 2013.[8] that monotherapy may not be sufficient for achieving adequate BP control in majority of the patients. Accordingly, in a National Health and Nutrition Examination Survey conducted on subjects aged ≥18 years, it was observed that combination therapy regimens helped to achieve BP goals.[12] Two-drug therapies as practiced in the two health institutions must have yielded better results in BP control than

monotherapies leading to increased prescription rates within the period. This pattern is recommended by guidelines, which state that small doses of different classes of antihypertensive drug are more beneficial than a high dose of one.[22] However, the prescription pattern results showed that within the period of study, the practice of mono-therapy was higher in SLHA (55.43±25.08%) than that of UUTH (49.54±6.98%) but there was no significant difference ($p>0.05$) when compared statistically. Similarly, the rate of two-drug combination prescriptions was significantly ($p<0.05$) higher in SLHA (49.63±5.05%) when compared to that of UUTH (30.53±7.91%). Also, the three-drug combination was highly practiced in UUTH with a rate of 19.90±2.04% which was significantly ($p<0.001$) higher when compared to that of SLHA (6.43±0.75%) within the same period. This change in rate and pattern could have been due to the clinical experiences and awareness of the physicians in the two hospitals.[23]

In SLHA, the study showed that there was increased prescription of CCBs (39.99%) followed by ACE inhibitors (22.35%), while in UUTH increased prescription frequencies of CCBs (37.20%) and diuretics (24.68%) were observed either in mono-therapies or combination. The above pattern confirmed that the two health institutions have been adhering to the guidelines though differently. JNC 8 in 2014 recommended that in the general black population, initial treatment of hypertensive patients including those with diabetes, should include a thiazide diuretic or calcium channel blocker.[24] If the target blood pressure is not reached within one month after initiating therapy, the dosage of the initial medication should be increased or a second medication should be added (thiazide diuretic, calcium channel blocker, ACE inhibitor, or ARB; but not to combine an ACE inhibitor with an ARB). The results show that the two Health institutions in Uyo followed the guidelines. The prescription pattern also corroborates that of Joseph *et al*. (2014)[18] who used Phadke's criterion for assessment of appropriateness of prescribing. They observed that most patients were being treated with two or more drugs and CCBs were most frequently prescribed antihypertensive medicines. On comparison, it was found that the prescription rates of diuretics and ARBs in SLHA were significantly ($p<0.01$-0.05) higher than that of UUTH, while the rate of prescription of beta blockers was higher significantly ($p<0.05$) in UUTH when compared to that of SLHA.

From the study, it could be seen that more patients were recruited from SLHA than UUTH this was because the study only focused on uncomplicated cases which are easily and commonly handled in a secondary health institution like SLHA. Complicated cases with diabetes and other diseases are always referred to and handled in tertiary hospitals like UUTH who has facility, equipment and highly trained man power for treat such cases.[25,26] This reason and affordability explain the high number of new uncomplicated hypertension cases in SLHA than UUTH.

CONCLUSION

From the study, it was observed that practitioners in the two health institutions in Uyo; St Luke's Hospital, Anua and University of Uyo Teaching Hospital, adhered to the current guidelines (JNC 8) on the management of hypertension patients. Also, the prescription pattern and rates showed that there were declines in monotherapies within the study period, while two-drug therapies were on the increase. More so, CCBs were the most prescribed drugs and used in combination with ACE inhibitors or diuretics.

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REFERENCES

1. Go AS, Mozaffarian D, Roger VL, American Heart Association Statistics Committee and Stroke Statistics Subcommittee, et al. Heart disease and stroke statistics – 2014 update: A report from the American Heart Association. Circulation, 2013; 129: e28–292.
2. World Health Organization (WHO). A global brief on hypertension. Available at: http://www.who.int /cardiovascular_diseases/publications/global_brief_hypertension/en/. Accessed on, 02 Jan 2015.
3. James PA, Oparil S, Carter BL, Eighth Joint National Committee (JNC 8) Members, 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), Supplemental Content. Journal of the American Medical Association, 2014; 311: 507–520.
4. Lim SS, Vos T, Flaxman AD, et al. A comparative risk assessment of burden of disease and injury attributable to 67 risk factors and risk factor clusters in 21 regions, 1990–2010: a systematic analysis for the Global Burden of Disease Study 2010. Lancet, 2012; (380): 2224–60.
5. Gupta R, Gupta VP. Hypertension epidemiology in India: lessons from Jaipur Heart Watch. Current science, 2009; 97(3): 349–55
6. Fadare JO, Agboola SM, Opeke OA, Alabi RA. Prescription pattern and prevalence of potentially inappropriate medications among elderly patients in a Nigerian rural tertiary hospital. Ther Clin Risk Manag, 2013; 9: 115–20.
7. Amira CO, Okubadejo NU. Antihypertensive pharmacotherapy in a developing economy: pattern, acquisition costs and conformity to international guidelines in a tertiary-care settingJsetting. J Human Hypertens, 2006; 20: 894–7.

8. Al-Drabah E, Irshaid Y, Yasein N, Zmeili S. Prescription pattern of antihypertensive drugs in Family Practice Clinics at Jordan University Hospital. Med Sci., 2013; 2(1): 469–88.
9. Hussain Z, Sana A, Mohammed S, Razzaq MA. Patterns of drug therapy among diabetic hypertensive patients with other complications. Int Jn. Pharm Pharm Science, 2014; 6(6): 270–7.
10. Altaf M, Rasheed A, Mujtaba A, Mohammed S. Drug utilization evaluation of antihypertensives in geriatric patients in a tertiary care hospital. Int J Pharm Pharm Sci., 2014; 6(9): 261–4.
11. Shobana J, Semere M, Sied M, Eyob T, Russom M. Prescribing pattern of anti - hypertensive drugs among hypertension patients with cardiac complications in Eritrea. Lat. Am. Jn. Pharm. 2013; 32(5): 745–8.
12. Beg MA, Dutta S, Varma A, Kant R, Bawa S, Anjoom M, *et al*., Study on drug prescribing pattern in hypertensive patients in a tertiary care teaching hospital at Dehradun, Uttarakhand. Int. Journal Med. Sci. Public Health, 2014; 3(8): 922–6.
13. Fischer MA, Avorn J. Economic implications of evidence-based prescribing for hypertension: can better care cost less? JAMA, 2004; 291(15): 1850–6.
14. Ekuma, A. E., Ijezie, E., Akpabio, T. and Onwuezobe, I. A. Survey of antimicrobial consumption in a university teaching hospital in southern Nigeria. Annals of Tropical Pathology, 2019; 10(1): 48 – 51.
15. Mancia G, Fagard R, Narkiewicz K, Redon J, Zanchetti A, Bohm M, et al. 2013 ESH/ESC guidelines for the management of arterial hypertension: the Task Force for the Management of Arterial Hypertension of the European Society of Hypertension (ESH) and of the European Society of Cardiology (ESC). Eur. Heart Journal, 2013; 34(28): 2159–219.
16. Tandon VR, Sharma S, Mahajan S, Mahajan A, Khajuria V, Mahajan V, *et al.,* Antihypertensive drug prescription patterns, rationality, and adherence to Joint National Committee-7 hypertension treatment guidelines among Indian postmenopausal women. Journal Mid-life Health, 2014; 5: 78–83.
17. Xu H, He Y, Xu L, Yan X, Dai H. Trends and patterns of five antihypertensive drug classes between 2007 and 2012 in China using hospital prescription data, Int. Journal of Clin. Pharmacol. Ther, 2015; 53: 430–7.
18. Joseph S, Verghese N, Thomas L. A study on prescribing pattern of antihypertensive medications in a tertiary care hospital in Malabar region. Der Pharmacia Lettre, 2014; 6(4): 132–7.
19. Kidney Disease; Improving Global Outcomes (KDIGO) Blood Pressure Work Group. KDIGO clinical practice guideline for the management of blood pressure in chronic kidney disease. Kidney Int. Suppl, 2012; 2(5): 337–14.
20. Odili VU, Oghagbon EK, Ugwa NA, Ochei UM, Aghomo OE. Adherence to international guidelines in the management of hypertension in a tertiary hospital in Nigeria. Tropical Journal of Pharmaceutical Research, 2008; 7(2): 945–52.
21. Shipra J, Prerna U, Jaswant G, Kumar A, Pushpawati J, Vikas S, *et al*., A systematic review of prescription pattern monitoring studies and their effectiveness in promoting rational use of medicines. Perspect Clin Res., 2015; 6: 86–90.
22. Xavier D, Noby M, Pradeep J, Prem P. Letter to the editor. Pattern of drug use in hypertension in a tertiary hospital: A cross sectional study in the inpatients ward. Indian Journal of Pharmacol, 2001; 33: 456–457.
23. Sipila R, Helin-Salmivaara A, Korhonen MJ, Ketola E. Change in antihypertensive drug prescribing after guideline implementation: A controlled before and after study. BMC Family Practice, 2011; 12: 87.
24. Flack JM, Sica DA, Bakris G. International Society on Hypertension in Blacks. Management of high blood pressure in Blacks: an update of the International Society on Hypertension in Blacks consensus statement. Hypertension, 2010; 56(5): 780–800.
25. Osibogun A, Okwor T. Anti-Hypertensive prescription and cost patterns in an outpatient department of a teaching hospital in Lagos State Nigeria. Journal Preventive Med, 2014; 4: 156–63.
26. Rachana PR, Anuradha HV, Shivamurthy MC. Antihypertensive prescribing patterns and cost analysis for primary hypertension: A retrospective study. Journal Clinical Diagnosis and Research, 2014; 8(9): 19–22.