

Prescribing Patterns of Antihypertensives and Antidiabetics in Public and Private Healthcare Centres in North Central Nigeria

Dauda Audi Dangiwa¹, Nanloh Samuel Jimam¹, Thony Waka Udezi², Esther Hayab³, Grace Musa Ebuga³, Victory Onize Olutuase¹, Victor Sunday⁴, Bala Iliyasu Shuaibu⁵

¹Department of Clinical Pharmacy and Pharmacy Practice, University of Jos, Jos

²Department of Clinical Pharmacy and Pharmacy Practice, University of Benin, Benin City

³Pharmacy Department, Bingham University Teaching Hospital

⁴College of Health Sciences, Benue State University

⁵Pharmacy Department, Rasheed Shekoni Specialist Hospital, Dutse

ARTICLE INFO

Article history:

Received 30 June 2022
Revised 24 May 2022
Accepted 2 Sept 2022
Online 30 October 2022
Published

Keywords:

Antihypertensive,
Antidiabetics,
Prescribing Pattern,
North central Nigeria,
Faith based,
Private and Public.

* Corresponding Author:

daudadangiwa@gmail.com
<https://orcid.org/0000-0002-4658-2785>
+234 803 722 4113

ABSTRACT

Background: Antihypertensive and antidiabetic pharmacotherapy effectively reduces hypertension and diabetic-related morbidity and mortality. Prescribing pattern surveys is one of the drug use evaluation techniques providing an unbiased picture and identification of suboptimal prescribing patterns. The aim of the study is to describe prescription pattern of antihypertensives and antidiabetics in public and private healthcare centres.

Method: A cross sectional retrospective study was conducted to obtain related information from prescriptions of 360 patients treated for hypertension and diabetic-related ailments at the public and missionary hospitals, private clinics and community pharmacies with the aid of a data collection sheet.

Results: One hundred sixty eight (47.6%) of the patients whose prescription were evaluated were male, with 192 (53.3%) been female counterparts. Those from 45 years and above constituted the highest percentage (76.6%) that were managed for hypertension and diabetic-related ailments across the facilities. Most of the patients (84.2%) were married people, and many of them (45.8%) were government workers. Lisinopril was the highest prescribed in the facilities (44.28%) compared to other antihypertensives, followed by amlodipine ((38.42%), with hydralazine been the least prescribed (0.4%). For the antidiabetics, biguanides were the most commonly prescribed medicine (63.1%), compared to the sulphonyl urea (27.55%). With respect to number of antidiabetics per prescription, two drugs were the most prescribed pattern (86.3%), and dual therapy were the most prescribed in the faith based (83.20%), private (96.40%) and public (94.4%) healthcare facilities. In all, majority (68.5%) of the prescriptions were by brand with 31.5% by generics names.

Conclusion: Diuretics were the most prescribed antihypertensive across faith based, government owned and private health care centres and most patient required two drugs to maintain their blood pressure mostly combined. Biguanides were the most prescribed class of antidiabetics. For hypertension comorbid with diabetes, Biguanides, Sulphonylureas, Glyptins and insulin were mostly combined. Branded medications were more prescribed than generics.

1. Introduction

Diabetes and hypertension are the major burden of global health, World Health Organization (WHO) projects about 300 million people will suffer from diabetes and about 1.5 billion from hypertension by 2025¹. Diabetes mellitus is a group of metabolic disorders which develops when insulin secretion can no longer compensate for insulin resistance².

The effects of diabetes mellitus include organ damage, dysfunction such as retinopathy, nephropathy and cerebrovascular diseases. Diabetes mellitus is one of the most common diseases worldwide, with the number of people affected continually increasing. Its presence can shorten the normal lifespan of an individual by up to one-fifth⁵. As of 2015, diabetes affects ~30.3 million Americans, or about 9.4% of the population⁶. Worldwide,

the number is estimated to be a staggering 422 million adults, and if the incidence continues to rise at its current pace, the number of people with diabetes is projected to reach 592 million by 2035.

Hypertension is a common co-morbidity in patients with type 2 diabetes. A large proportion of patients with hypertension do not have optimal blood pressure control, and these might be influenced by many factors including inadequate adherence to drugs and instructions on lifestyle modifications, poor compliance with treatment guidelines on the part of prescribing doctors and lack of appropriate antihypertensive drugs. The prevalence of the disease is higher in patients with diabetes than in the general population. The coexistence of hypertension and diabetes increases the incidences of cerebrovascular disease and mortality and augments the risks of nephropathy and retinopathy⁴. The importance of patients' management in the primary care setting cannot be overstated. The JNC 8 guidelines published in 2014 are the most recent guidelines for the management of hypertension in different clinical settings. These guidelines were developed based on a systematic review of literature to help clinicians, especially the primary care physicians⁸. Despite these guidelines, and also evidence showing that hypertension is a major public health concern, many clinicians fail to assess BP routinely, and in those with a diagnosis of hypertension, do not start treatment or titrate the dosage of the drugs effectively⁹.

While a physician plays a vital role to prescription of medicines, a pharmacist plays a keen job to evaluate the prescription pattern in order to optimize a successful therapy². The increasing prevalence of hypertension and the continually increasing expense of its treatment influence the prescribing patterns among physicians and compliance to the treatment by the patients¹⁰. The aim of this study is to describe the prescription pattern of antihypertensives and antidiabetics in public and private healthcare centres in some states of North-Central Nigeria and compare them with recent Nigeria Standard Treatment guidelines.

1. Method

2.1 Study location

The present study was conducted in eight (8) outpatient pharmacies in Jos University Teaching Hospital (JUTH), Bingham University Teaching Hospital (BHUTH), Federal Medical Centre (FMC) Keffi, Evangelical Reformed Church of Christ Hospital (ERCCH) Alushi, Apex Clinic and Sunnah Clinic of Plateau and Nasarawa states, all located in the north-central geopolitical zone of Nigeria.

2.2 Study design and population

A facility-based cross-sectional retrospective evaluation was conducted at eight (8) selected healthcare facilities. Past prescriptions of patients between the age groups of 18 years old and above that were managed for hypertension and diabetic-related ailments at the selected healthcare facilities were studied and relevant information extracted from 360 patients' treatment records using a data collection sheet. Ethical and administrative approvals for the study were granted by the Ethics Committees of Jos University Teaching Hospital (JUTH) and Federal Medical Centre (FMC) Keffi through approval letters with references JUTH/DCS/ADM/127/XXV/316 and NHREC/21/12/2012; dated 13/10/2017 and 06/02/2018, respectively.

2.3 Inclusion and exclusion criteria: Records of patients of both gender and within the ages of ≥ 18 years that were managed for hypertension and diabetic-related ailments between October, 2018 and March, 2019 in the selected facilities were retrieved for study.

2.4 Data collection Data Analysis

Information was obtained from the pharmacies of public and missionary hospitals, private clinics, and community pharmacies with the aid of a data collection sheet to obtain the name of the antihypertensive drugs (branded and generic), the usual quantities and price for a month supply to patients. The extracted patients' treatment information was appropriately coded and entered into Microsoft Excel software, followed by descriptive analysis and Chi-square test for association set at $P < 0.05$ levels of significance using International Business Machines Corporation Statistical Package for Social Sciences[®] (IBM-SPSS[®]) version 20 software.

2. Results

3.1 Patients' demography

In all, 360 patients' prescriptions were evaluated, and one hundred sixty eight (47.6%) were for male, with 192 (53.3%) for the female counterparts. Patients within the age brackets of 55 years old and above constituted the highest percentage (44.4%) that were managed for hypertension and diabetic-related ailments across the facilities as at the time of the data collection, while those between 45 and 54 years old made up about 32.2% of the study population, and those in the age range of between 18 and 24 years were the least in number (0.8%) that were treated for the disease in

the healthcare facilities. Most of the patients (84.2%) were married people, and many of them (45.8%) were government workers, followed by 23.1% who were self-employed (Table 1).

Table 1: Socio-demographic characteristics of participants (N=360)

	Sub -Group	Frequency	Percent age (%)
Gender	Male	168	46.7
	Female	192	53.3
Age (Years)	18 -24	3	0.8
	25 -34	18	5.0
	35 -44	63	17.5
	45 -54	116	32.2
	≥ 55	160	44.4
Marital Status	Married	303	84.2
	Single	11	3.1
	Others	46	12.8
Occupation	Student	1	0.3
	Government worker	165	45.8
	Self -Employed	83	23.1
	Unemployed	18	5.0
	Private sector worker	69	19.2
	Retired	24	6.7

3.2 Antihypertensive and antidiabetic prescription patterns in selected healthcare facilities

The result of the study (**Figure 1**) revealed that Lisinopril was the highest prescribed in the facilities (44.28%) compared to other antihypertensives, followed by amlodipine ((38.42%), with hydralazine been the least prescribed (0.4%). For the antidiabetics, biguanides were the most prescribed medicine (63.1%), compared to the sulphonyl urea (27.55%) (**Figure 2**). With respect to number of antidiabetics per prescription, two drugs were the most prescribed pattern (86.3%), followed by three (11.20%), with four medicines per prescription constituting the least (0.90%) (**Figure 3**). Dual therapy was the most prescribed in the faith based (83.20%), private (96.40%) and public (94.4%) healthcare facilities (**Figure 4**). In all, 68.5% of the prescriptions were by brand while 31.5% was by generics names (**Figure 5**).

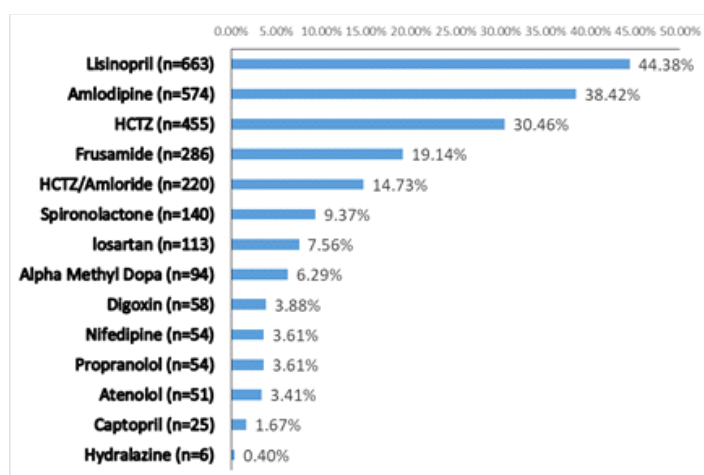


Figure 1 Prescribing Pattern of Anti-hypertensives

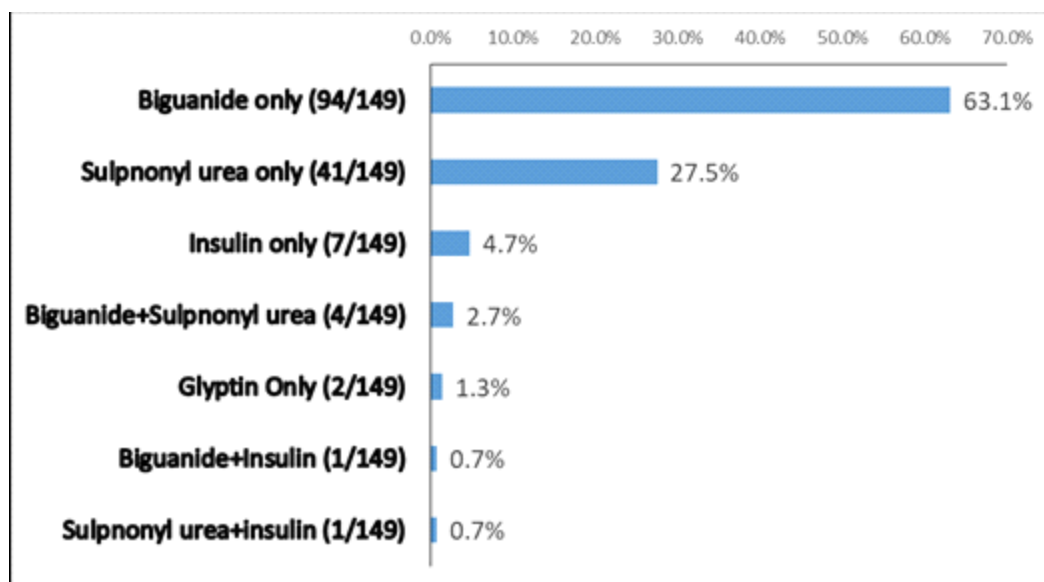


Figure 2 Prescribing pattern of anti-diabetics

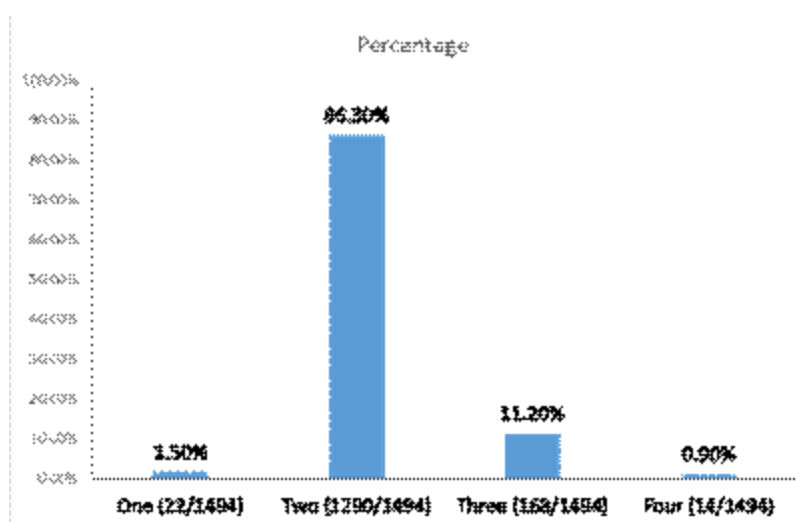


Figure 3 Number of drug combinations of Anti diabetics per prescription

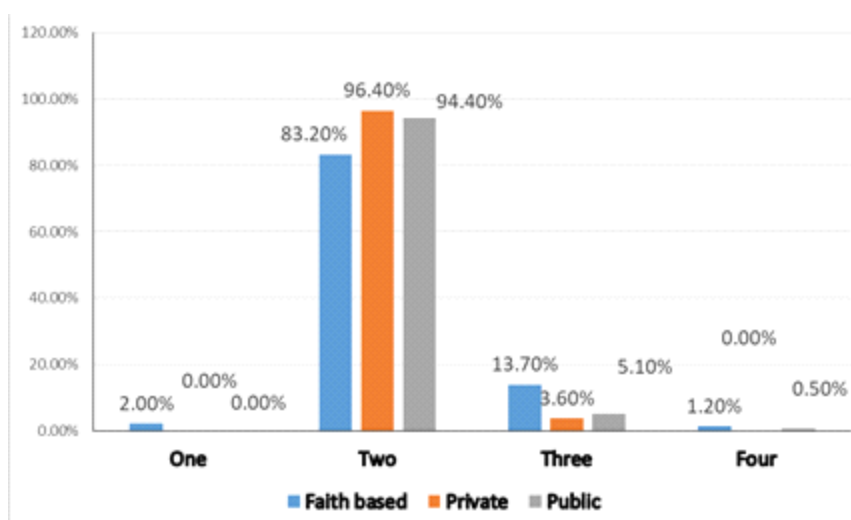


Figure 4 Antihypertensive drugs per prescription

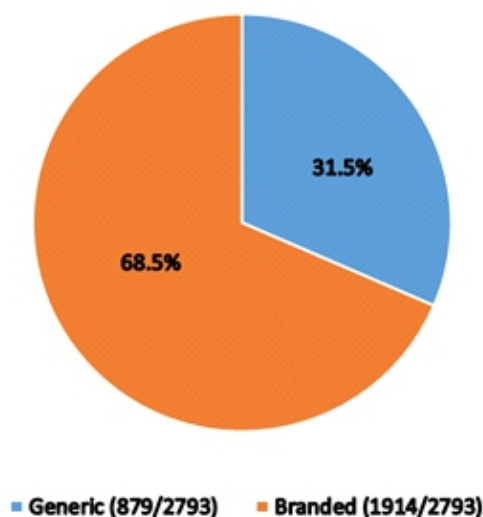


Figure 5 Pie chart showing the distribution of drugs prescribed.

Table 2 Antihypertensive and Cardiovascular drug class combination in a Public Health Facility

Number of drug class	Drug class	Frequency	Percentage of prescription
One	DIU	254	16.21
	ACEI	128	8.17
	CCB	120	7.66
	CEN	47	3.00
	BB	25	1.60
	ARB	21	1.34
Two	CCB+ACEI	280	17.87
	ACEI+Diuretic	266	16.98
	CCB+DIU	152	9.70
	BB+DIU	32	2.04
	CCB+ARB	17	1.08

Table 3: Showing consumption pattern in faith based, private and public health facilities

Number of drug class	Drug class	FBH (N=897)	Govt (N=193)	Private (N=404)	Chi-square (p-value)
Number (%) of prescriptions					
One	CCB	77 (8.58)	12 (6.22)	31 (7.67)	1.301 (0.522)
	ACEI	79 (8.81)	15 (7.77)	34 (8.42)	0.234 (0.89)
	ARB	16 (1.78)	1 (0.52)		
	BB	14 (1.56)	3 (1.55)	8 (1.98)	
	CEN	27 (3.01)	8 (4.15)	12 (2.97)	0.728 (0.695)
	DIU	152 (16.95)	35 (18.13)	67 (16.58)	0.228 (0.892)

Two	CCB+ACEI	165 (18.39)	46 (23.83)	69 (17.08)	4.091 (0.129)
	CCB+ARB	11 (1.23)	3 (1.55)		
	CCB+BB	3 (0.33)	0 (0)		
	CCB+Cent	4 (0.45)	1 (0.52)		
	CCB+DIU	87 (9.7)	16 (8.29)	49 (12.13)	2.66 (0.264)
	ACEI+BB	9 (1)	2 (1.04)		
	ARB+DIU	5 (0.56)	0 (0)		
	ACEI+Cen	6 (0.67)	0 (0)		
	ACEI+Diuretic	165 (18.39)	33 (17.1)	68 (16.83)	0.54 (0.763)
	BB+VD	1 (0.11)	1 (0.52)		
	BB+Cen	1 (0.11)	0 (0)		
	BB+DIU	18 (2.01)	2 (1.04)	12 (2.97)	
Three	CCB+ACEI+ARBA	1(0.11) (0.)	00 (0) (0)		
	CCB+ACEI+BB	1 (0.11)	1 (0.52)		
	CCB+ACEI+CEN	0 (0)	1 (0.52)		
	CCB+ACEI+DIU	67 (7.47)	18 (9.33)	30 (7.43)	0.828 (0.661)
	CCB+ARB+DIU	9 (1)	3 (1.55)	5 (1.24)	
	CCB+BB+DIU	6 (0.67)	2 (1.04)		
	CCB+BB+ARB	2 (0.22)	0 (0)		
	CCB+CEN+DIU	2 (0.22)	0 (0)		
	ACEI+BB+DIU	6 (0.67)	2 (1.04)		
	ACEI+CEN+DIU	2 (0.22)	0 (0)		
	ARB+BB+DIU	2 (0.22)	0 (0)		
	ARB+VD+DIU	1 (0.11)	0 (0)		
Four	CCB+ACEI+BB+DIU	1 (0.11)	1 (0.52)		
	ARB+BB+VD+DIU	1 (0.11)	1 (0.52)		

Key: DIU=Diuretics; CCB=Calcium channel blockers; ACEI=Angiotensin converting enzyme inhibitors; ARB=Angiotensin receptors blockers; BB=Beta blockers; VD = vasodilators; CEN= centrally acting Antihypertensives.

4. Discussion

There were more females than males, females made 53.3% of our study population with male constituting 46.7%, and the male: female ratio was 0.89, which was less than one. Although this finding agrees with the reports of some studies, however, it is in contrast with the finding of a prevalence study of hypertension in the general population in Nigeria¹¹. The high percentage (76.6%) of the patient within the aged bracket of 45 years and above managed for hypertension and diabetic-related ailments across the facilities was consistent with age dependent risk for hypertension^{12, 13}. In this study out of 360 participants 37.98% used monotherapy in the management of hypertension (Table 2), with diuretics been the most commonly used medication (16.21%), although a study conducted in India observed that single-drug therapy accounted for 55.86% with CCBs more commonly employed than multiple-drug therapy¹⁵; other studies done by Sindhu and Srinivasa showed blood pressure could be adequately controlled with the help of single-drug therapy.

They attributed this to patient's compliance, good response, and less incidence of adverse effects¹⁶. 50.6% used two drug combinations with CCB+ACEI been the most used combination accounting for 17.87%, followed by ACEI + Diuretics (16.98%). Faith based hospitals prescribed more diuretics 152 (16.95%) compared to government owned and private health care centres 35(18.13%) and 67(16.58%) respectively. Most health care centres used two antihypertensives prescribing pattern. 83.20%, 96.40% and 94.40% for faith, private and public facilities, respectively. Many patients were on triple therapy in faith-based health centres (13.70%) compared to government owned and private health centres; 3.60% and 5.10% respectively (Table 3). This suggested compliance to the recommendations of the JNC 8 and ASH/ISH which recommended that CCB or thiazide diuretic be used as first line monotherapy medications for people of African descent and ARB or ACEI added if needed to reach target blood pressure¹⁷. From our study 88.58% used one or two drug to maintain blood pressure, only 11.42% need three or more

antihypertensive medication to maintain their blood pressure. This was in agreement with a study done by Olusegun et al which reported 84.9% of patients used more than one drug. This suggests that most hypertensive patients will require more than one medication to maintain their blood pressure. More than 10% (10.78%) used triple therapy, with CCB + ACEI + Diuretic accounting for 115 (7.34%), only 4 (0.26%) used four drug combinations. This agreed with a study done by Fiona et al¹⁸; 1.5% required triple therapy and only 0.3% need four drug combinations. Biguanide were the most consumed antidiabetic 94(63.1%), sulphonylurea 41(27.55%), Insulin 7 (4.7%), Biguanide + Sulphonyl urea 4(2.7%), Glyptin only 2(1.3%), Biguanide + Insulin 1(0.7%) and sulphonylurea + insulin 1(0.7%). Two drugs were the most prescribed pattern 1290(86.30%), Three 168(11.20%), one 22(1.50%) and Four 14(0.90%). Metformin was the most prescribed drug (79.6%), followed by sulphonylurea class of drugs (66.9%). Nearly 17.7% patients were on insulin preparations. Glimepiride and metformin were the most common combinations used (45.5%)¹⁹. In a study conducted by Nithin et al¹⁷, they showed that 99.49% used monotherapy antidiabetic medication, 39.5% used dual therapy and 11% needed triple therapy to control blood glucose. Glimepiride + Metformin was the most used drug combination accounting for 18.12%, insulin +metformin was the second most prescribed combination accounting for 5%. But the study revealed that human insulin was the most prescribed 26.5% above metformin 15%. This study asserts that it was more effective to treat type 2 diabetes with insulin and sulphonylurea. The result of this study is as expected as the study was conducted in a tertiary care centre where most patients will require insulin for surgery or to treat complication.

A study conducted by Akshay et al.^{18,19} indicated that metformin was the commonest prescribed class 31.65%, sulphonyl urea accounted for 20.25%. All prescribed oral anti diabetics accounted for 56.4% while insulin accounted for 43.6%.²¹ The high use of insulin in this study may be due to the use of short acting hypoglycaemic drugs. Another study done by Mohd et al^{18,19}, showed that most prescribed antidiabetic was metformin with 57.3% using the drug, Glimeperide + metformin were the most used drug combination 17.63%, glimepiride was the second most used monotherapy after metformin while sitagliptin + metformin+ glimepiride was the second most used combination therapy. They cited reduced side effect and ability of metformin to reduce diabetes related complications as well as their effectiveness.¹⁹ Most of the

drug's prescription used branded names 68.52%, 31.47% used generic names mostly due to market influences.

5. Conclusion

Our study showed that most prescription were based on the JNC 8 guidelines, Diuretics were the most prescribed antihypertensive across faith based, government owned and private health care centres and most patient required two drugs to maintain their blood pressure mostly combined; biguanides were the most prescribed class of antidiabetics, while branded medications were more prescribed than generics.

RECOMMENDATION

The use of generic products in public facilities should be extended to the private. Screening of the people should be done to reduce the prevalence, thereby reducing complications leading to morbidity and mortality. Health insurance coverage should be reinforced in Nigeria.

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