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Evaluation of patients' perception and satisfaction with pharmacists' intervention in hypertension management in Akwa Ibom State, Nigeria

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Abstract
This study evaluated patients' perception and satisfaction with pharmacists' intervention in hypertention management in Uyo metropolis, Akwa Ibom State, Nigeria. A prospective, longitudinal, two-arm parallel, non-randomized controlled trial was conducted between January and July 2023 across five community pharmacies. A total of 268 hypertensive patients were recruited, with 134 assigned to an intervention group receiving structured pharmacist-led care comprising adherence counselling, lifestyle education and weekly follow-up via phone and SMS and 134 to a control group receiving routine pharmacy care. Blood pressure was monitored weekly using a validated Omron electronic device, while medication adherence and patient perception and satisfaction were assessed at baseline, three months and six months using the Medication Adherence Report Scale-5 and modified perception and satisfaction questionnaires. Out of 268 participants, 249 completed the study. The intervention group showed reductions in systolic (14.8 mmHg at three months; 11.5 mmHg at six months) and diastolic blood pressure (9.3 mmHg at three months; 8.0 mmHg at six months), alongside improved adherence scores (baseline 73.4 ± 15 to 92.7 ± 10.5 at six months) and higher perception and satisfaction levels, whereas the control group experienced minimal improvements. The findings revealed that structured pharmacist engagement in community pharmacy settings enhances adherence, patient perception and satisfaction supporting better hypertension control and safer medication practices. The researchers recommended that community pharmacies should implement structured pharmacist-led counselling, education and follow-up programs to improve adherence and patient outcomes in hypertension management. Pharmacists should routinely monitor for and address drug-related problems, including dosing errors, side effects and non-adherence, to enhance medication safety.

Keywords: Hypertension, community pharmacy, pharmacist-led interventions, medication adherence, patient perception, akwa ibom state

Introduction

Hypertension is a medical condition characterized by persistently elevated systolic or diastolic blood pressure, with clinical thresholds of 140 mmHg or higher for systolic pressure and 90 mmHg or higher for diastolic pressure (WHO, 2021). Individuals under 60 years of age are generally advised to initiate treatment when readings meet or exceed these values, while adults over 60 are recommended to commence therapy at a systolic pressure of 150 mmHg or higher, with diastolic values remaining at 90 mmHg or above (Iqbal & Jamal, 2022)[21]. Patients with chronic conditions, including diabetes, are also guided by these targets, as evidence does not demonstrate additional benefit from stricter blood pressure control in these populations (McGinty *et al*., 2014)[27]. Worldwide, approximately 1.28 billion adults aged 30 to 79 years live with hypertension, with two-thirds residing in low- and middle-income countries, where sustained disease management often faces limitations in healthcare resources (WHO, 2021)[5]. Projections estimate this number could reach 1.56 billion by 2025, with Africa recording the highest regional prevalence at 27%, compared to 18% in the Americas (WHO, 2023). Hypertension remains a leading contributor to cardiovascular diseases, including stroke, heart failure, coronary artery disease and peripheral arterial disease and is responsible for substantial mortality and disability-adjusted life years worldwide (Franklin & Wong, 2013; Risk, 2016; Burnier & Egan, 2019; WHF, 2023)[12, 18, 46].

Persistent elevated blood pressure increases vulnerability to cardiovascular and renal disorders. Epidemiological data show that men with isolated systolic hypertension experience higher rates of heart failure, coronary heart disease, stroke and peripheral arterial disease than those with isolated diastolic hypertension (Franklin & Wong, 2013; Rahimi *et al*., 2015)[18, 36]. Global estimates indicate that uncontrolled hypertension accounts for a significant proportion of cardiovascular-related deaths, with annual mortality reaching approximately ten million (Lim *et al*., 2012; WHO, 2021). Clinical interventions employing antihypertensive medications reduce the incidence of myocardial infarction, stroke, heart failure and end-stage renal disease among treated individuals (James *et al*., 2014)[22]. Hypertension imposes economic pressures on households and healthcare systems. In low-and middle-income countries, cardiovascular diseases contribute to a loss exceeding four percent of gross domestic product annually (Al Berek, Mbewe & Ojo, 2021)[5]. Beyond the direct medical costs, complications from poorly controlled blood pressure reduce workforce productivity and increase demands on social services. In Nigeria and other regions with out-of-pocket healthcare financing, the financial burden of chronic disease management can impede adherence and limit access to necessary therapy (Ajayi, Salako & Ayodele, 2016)[4].

International efforts to reduce the burden of hypertension have included country-wide initiatives to prevent

cardiovascular events and improve disease control (WHO, 2020a). Digital health technologies, endorsed by the WHO, offer scalable support for monitoring and managing hypertension, including patient engagement, teleconsultation and remote blood pressure tracking (WHO, 2013; WHO, 2021)[33]. Despite these measures, long-term disease control remains uneven, particularly in regions with under-resourced health systems. Pharmacy practice has evolved from a product-focused model to patient-centered care. Pharmacists now provide medication therapy management, patient counseling, blood pressure monitoring and pharmacovigilance (Majchrowska *et al*., 2019; Hepler & Strand, 1990)[20, 25]. Pharmaceutical care emphasizes achieving health outcomes that enhance quality of life, including improving adherence to prescribed therapy and managing drug-related problems (Almarsdóttir *et al*., 2019)[12]. Hospitals and community pharmacies provide these services, often in collaboration with other healthcare providers, to support chronic disease management (Mazhar *et al*., 2017[26]; American Pharmacists Association, 2023). Patient counseling empowers individuals to manage their health decisions and adhere to treatment regimens. Home blood pressure monitoring complements clinical visits, enabling early detection of uncontrolled readings and prompt intervention. Pharmacists also provide drug information and monitor for adverse effects, contributing to patient safety and optimized therapy (Harm, 2017; Teshome *et al*., 2016)[26, 42].

Patients' perceptions of pharmacy services influence their engagement with treatment and adherence to medication plans. Factors affecting perception include accessibility, professional competence, communication skills, waiting times, availability and cost of medicines (Aderemi-Williams *et al*., 2017)[2]. Positive interactions between pharmacists and patients can enhance trust, promote adherence and support better health outcomes (Majchrowska *et al*., 2019)[25]. Theoretical models, such as the Health Belief Model and SERVQUAL, describe the relationships between patient expectations, experiences and service utilization. Patient satisfaction reflects experiences with healthcare delivery and serves as an indicator of service quality (Gourley *et al*., 2001; Schommer & Kucukarslan, 1997)[19, 39]. Satisfaction depends on factors including service accessibility, communication, counseling quality and perceived competence of healthcare providers. Evidence links higher satisfaction to improved medication adherence and better clinical outcomes (Oluwole *et al*., 2019)[34]. Assessing satisfaction supports health systems in identifying areas for improvement, strengthening the role of pharmacy services in managing chronic conditions and guiding policy and practice interventions (Jose *et al*., 2015; Mihailovic *et al*., 2017; Aziz *et al*., 2018)[11, 23, 28].

Uncontrolled hypertension increases the risk of stroke, chronic kidney disease, heart failure and other cardiovascular disorders (Castilla-Guerra, 2022; Sembulingam & Sembulingam, 2013)[13, 40]. Severe outcomes of primary hypertension include renal failure, left ventricular dysfunction, myocardial infarction, cerebral hemorrhage and retinal damage (Sembulingam & Sembulingam, 2013; Chillo et al., 2019)[15, 40]. These complications contribute to premature mortality and elevated disability-adjusted life years, particularly in low-resource settings. Nigeria faces increasing hypertension prevalence, with studies reporting rates exceeding 30% among adults, translating to over 27 million individuals affected by 2020[14] (Odili, Chori & Oluyombo, 2020; Adeloye *et al*., 2021). Prevalence differs between urban and rural populations, with South-East and South-South geopolitical zones reporting 52.8% and 44.6%, respectively (Odili, Chori & Oluyombo, 2020)[14]. Major risk factors include age, genetics, high-salt diets, obesity, physical inactivity, alcohol consumption and psychosocial stress related to urban living (Mills *et al*., 2018)[29]. Treatment adherence is often compromised by poor knowledge, side effects, forgetfulness and financial constraints, all of which hinder effective blood pressure control (Burnier & Egan, 2019; Ajayi, Salako & Ayodele, 2016)[4, 12].

Akwa Ibom State experiences rising hypertension prevalence influenced by demographic transitions, urbanization and dietary and lifestyle factors (Mills *et al*., 2018)[29]. Health service provision varies between urban and rural areas, with urban primary healthcare facilities better equipped with essential medicines and laboratory equipment, yet overall readiness for hypertension and diabetes care remains limited (Nwakile *et al*., 2023)[31]. Urban centers, including Uyo, exhibit concentrated exposure to modifiable risk factors, yet structured pharmacist-led interventions for chronic disease management remain uncommon. Constraints such as inadequate drug-revolving funds, insufficient healthcare personnel and limited access to affordable treatment contribute to the persistence of poorly controlled hypertension (Victor, Smith & Parker, 2018[44]; Parker, Santschi & Chiolero, 2017)[35]. This study therefore aims to assess patient perception of pharmacy services among hypertensive adults in Uyo Metropolis, Nigeria.

Statement of the Problem

Hypertension has emerged as a widespread chronic condition affecting millions of adults worldwide, with an estimated 1.28 billion people between the ages of 30 and 79 living with elevated blood pressure (WHO, 2021). The condition contributes to cardiovascular disorders, stroke, kidney disease and premature death, particularly in low- and middle-income countries where healthcare resources are limited (Castilla-Guerra, 2022; Sembulingam & Sembulingam, 2013)[13, 40]. In Nigeria, the prevalence of hypertension among adults has reached 32.5%, affecting over 27 million individuals, with urban areas and the South-East and South-South regions reporting rates as high as 52.8% and 44.6%, respectively (Odili, Chori & Oluyombo, 2020[14]; Adeloye *et al*., 2021). Despite widespread availability of antihypertensive medications, blood pressure control remains low. Non-adherence to prescribed therapy, poor patient understanding of disease and medications, adverse drug effects and financial constraints hinder optimal management (Burnier & Egan, 2019; Ajayi, Salako & Ayodele, 2016)[4, 12]. These challenges are exacerbated in states such as Akwa Ibom, where urbanization increases exposure to behavioral risk factors and rural areas experience limited access to healthcare facilities, essential medicines and trained personnel (Nwakile *et al*., 2023; Mills *et al*., 2018)[29, 31].

Pharmacy services play a key role in chronic disease management through patient-centered care, medication therapy management, counseling, blood pressure monitoring and pharmacovigilance (Hepler & Strand, 1990; Majchrowska *et al*., 2019)[20, 25]. However, in Uyo,

structured pharmacist-led interventions for hypertension are largely absent and patients' perceptions of pharmacists' competence, accessibility, communication and service quality influence utilization and adherence (Aderemi-Williams et al., 2017; Teshome *et al*., 2016)[2, 42]. Patient satisfaction with pharmacy services has been linked to adherence and clinical outcomes, yet evidence on these relationships in Nigerian urban settings is scarce (Oluwole *et al*., 2019; Jose *et al*., 2015)[23, 34]. The combination of high disease prevalence, inconsistent treatment adherence, limited pharmacist interventions and unclear patient perceptions constitutes a gap in effective hypertension management. Investigating patient experiences and satisfaction with pharmacy services in Uyo is necessary to inform interventions that could improve adherence, reduce drug-related problems and mitigate complications associated with uncontrolled hypertension.

Objectives of the Study

The general objective of this study was to assess patient perception of pharmacy services among hypertensive adults in Uyo Metropolis, Nigeria. The specific objectives were to:

1. assess the perception of pharmacy services and interventions among patients with hypertension.
2. evaluate the impact of pharmacist-led interventions on patient satisfaction in individuals with hypertension.

Review of Related Empirical Studies

Recent studies demonstrate both the structural readiness of health facilities and the pivotal role of pharmacists in optimizing patient outcomes. A study conducted by Aderemi-Williams *et al*. (2017)[2] on patients' perception of outpatient pharmacy services at Lagos University Teaching Hospital, cross-sectional survey of 428 patients revealed a median overall perception score of 59% (IQR: 45-73%), with higher scores for pharmacy appearance and pharmacist interaction (median 80%, IQR: 80-100%) compared to counseling and drug information services (median 58%, IQR: 33-75%). Notably, perception varied significantly across service points and educational status and occupation influenced scores, with more educated patients reporting lower satisfaction. The study highlighted the need to improve service quality, especially in counseling and essential drug availability, providing empirical evidence for context-specific determinants of patient evaluation of pharmaceutical services. Ukoha-Kalu, Adibe and Ukwe (2021)[43] evaluated pharmacist-led interventions among hypertensive patients with diabetes co-morbidity at a tertiary hospital. The intervention group showed significant improvements in medication adherence, physical activity, weight management and alcohol reduction, reinforcing the effectiveness of pharmacist-led education in promoting self-management behaviors. Pharmacy-based models augmented with mobile health (mHealth) technology have also proven feasible.

Similarly, Nwakile, Ekanem, Uchendu and Odili (2023)[31] assessed service-specific readiness for hypertension and diabetes care across urban and rural PHCs in Akwa Ibom State, Nigeria. Using the WHO Service Availability and Readiness Assessment (SARA) tool, 214 PHCs were evaluated for essential drugs, laboratory equipment and overall readiness. Findings indicated that urban facilities were better equipped than rural ones, with higher availability of essential medications (4.8% vs. 0.9%) and laboratory equipment (81.7% vs. 76.4%) and overall readiness scores of 23% versus 11%. Logistic regression identified the availability of drug-revolving funds (OR = 4.09; 95% CI = 1.03-1.12) and the number of health workers (OR = 1.08; 95% CI = 1.03-1.33) as significant determinants of readiness. Despite the relative advantage of urban PHCs, the study concluded that readiness for hypertension care was generally low, highlighting critical gaps in achieving WHO targets and emphasizing the need for targeted interventions to improve medication availability and human resources in PHCs (Nwakile *et al*., 2023). Ayogu, Yahaya, Isah and Ubaka (2023)[10, 31] conducted a two-arm randomized controlled trial among 128 hypertensive patients in community pharmacies in Abuja and Lokoja. The intervention group exhibited significantly higher adherence (MARS-10: 8.05 ± 1.32) and improved physical health outcomes, alongside modest reductions in treatment costs. The study advocated for integrating community pharmacists into national hypertension management strategies to deliver structured patient education.

Furthermore, Ghana, Apedzi and Apedzi (2024)[9] assessed outpatient pharmacy service delivery and hypertensive patients' satisfaction across three hospitals. Using a mixed-method explanatory sequential design, the study found that satisfaction was generally high, driven by pharmacist-led patient education, continuity of care and stable staffing in pharmacy departments. The findings underscored the importance of sustained patient-pharmacist interaction, counseling and follow-up in enhancing satisfaction among patients with chronic conditions. Patient satisfaction has been linked to adherence and treatment outcomes in hypertension management. Oluwole *et al*. (2019)[34] investigated this association among 500 hypertensive patients at Lagos University Teaching Hospital using the MMAS-8 and TSQM. Findings revealed moderate adherence among the majority (89.2%) and a significant positive correlation between treatment satisfaction and adherence (p = 0.000), emphasizing the need for patient-specific counseling to improve outcomes. In a similar study, Ofili *et al*. (2021)[33] assessed patient satisfaction among 200 hypertensives at Federal Medical Centre, Asaba. Overall satisfaction was high (88.5%), but socio-demographic variables such as education and occupation influenced specific satisfaction domains, suggesting that structural and interpersonal aspects of care shape patient perceptions and engagement with health services.

Collectively, these studies indicate that both structural readiness of PHCs and quality of pharmaceutical care are critical determinants of hypertension management outcomes in Nigeria and similar LMIC settings. Structural gaps, such as low availability of essential drugs and insufficient human resources, limit effective service delivery in PHCs, particularly in rural areas (Nwakile et al., 2023)[31]. Concurrently, patient perception and satisfaction with pharmacy services influence adherence, engagement and health outcomes (Erah & Chuks-Eboka, 2008; Oluwole *et al*., 2019)[16, 34]. Pharmacist-led interventions, whether through education, counseling, or mHealth-facilitated care, have been consistently associated with improved adherence, self-management and patient satisfaction, reinforcing the need for integrating pharmacists into chronic disease management strategies (Ayogu *et al*., 2023; Ukoha-Kalu *et al*., 2021)[10, 43].

Methodology

Study Design and Setting

The study adopted a prospective, longitudinal, open-label, two-arm parallel, non-randomized controlled trial design with a follow-up period of six months. It was conducted in five community pharmacies in Uyo Metropolis, Akwa Ibom State, Nigeria, which were chosen based on their strategic locations along major city roads and their relatively high patient volumes. The participating pharmacies included Dammes Pharmacy (Abak Road Housing), Tibest Pharmacy (Calabar-Itu Road), Fortrez Pharmacy (Idoro Road), Onestop Pharmacy (Udo Udoma Avenue) and Amela Pharmacy (Nwaniba Road). Prior to the study, the pharmacy directors were fully informed about the study objectives and procedures and written informed consent was obtained from each establishment

Population/Sampling Technique

The study population consisted of adults with a confirmed diagnosis of hypertension who accessed medication services at the selected community pharmacies in Uyo Metropolis between January and July 2023[31]. Participants were recruited through a purposive sampling method, a non-probability approach suitable for including individuals actively engaged in routine hypertension care. This strategy enhanced the ecological validity of the study by focusing on participants with relevant experiences in community pharmacy settings. As noted by Etikan, Musa and Alkassim (2016)[17], purposive sampling enables researchers to intentionally select participants whose characteristics and experiences correspond with the study objectives, ensuring the sample accurately represents the target population for evaluating pharmacist-led interventions in hypertension management.

Instrument for Medication Adherence

Medication adherence was evaluated using the Medication Adherence Report Scale-5 (MARS-5), a validated self-reported instrument widely employed in chronic disease research. Participants' responses were rated on a five-point Likert scale: 5 = Never, 4 = Rarely, 3 = Sometimes, 2 = Often and 1 = Always. The total scores ranged from 5 to 25, with higher scores indicating better adherence to prescribed antihypertensive therapy. This scoring system provided a continuous measure of adherence, allowing for the detection of variations across individuals and over time (Chan, Horne, Hankins & Chisari, 2020; Spetz et al., 2024)[14, 41]. The MARS-5 was selected for this study due to its established validity, reliability and ease of administration in community-based settings, making it suitable for evaluating adherence among patients receiving routine care in community pharmacies.

Sample size determination

The sample size was calculated to detect a mean reduction in systolic blood pressure (SBP) of 6.8 mmHg with a standard deviation (SD) of 16 mmHg and two-sided significance level of 5% ($\alpha = 0.05$) and a power of 80% ($\beta = 0.20$). The calculation was based on the formula for comparing two means:

$$n = [(Z_{\alpha/2} + Z_{\beta})^2 \times \{2(\delta)^2\}] / (\mu_1 - \mu_2)^2$$

where:

n = sample size required in each group,

$Z_{\alpha/2}$ = the 95% confidence interval statistic at $\alpha = 0.05$ for a 2-sided test (=1.96)

$Z_{\beta} = 0.84$, for a Power of 80

δ = standard deviation (=16)

$\mu_1 - \mu_2$ = clinically significant difference (6.8) obtained from a previous study among hypertensive patients (Morgado *et al*., 2011)[30];

Substituting these values in the formula, n = 87.

Thus, the minimum required sample size was 87 participants per group, giving a total of 174 participants for both groups. To accommodate a possible drop-out rate of up to 50%, the final recruitment target was increased to 268 participants, with 134 allocated to each group (intervention and control).

Inclusion/Exclusion Criteria

The study enrolled adult male and female patients aged 18 years and above with a confirmed clinical diagnosis of hypertension, who had been on antihypertensive therapy for at least one year prior to enrollment. Only individuals who were permanent residents of Uyo Metropolis were considered eligible. Pregnant women and patients who declined to provide informed consent were excluded to prevent confounding and address ethical considerations.

Data collection

Pharmacists at the selected community pharmacies were trained on study procedures, including adherence counselling, health education and exercise guidance using a written protocol. Eligible patients were recruited after attending the pharmacy, informed about the study objectives and provided written consent. Participants were sequentially assigned to the control or intervention group. Blood pressure (BP) readings were taken at least three times in a seated position using an Omron electronic device. Sociodemographic and clinical data including gender, age, education, marital status and current antihypertensive medications were self-reported. The MARS-5 adherence questionnaire was administered at baseline, three months and six months, while perception and satisfaction questionnaires were completed at baseline and six months.

The control group received standard pharmacy care, with weekly BP monitoring. The intervention group received a structured pharmacist-led program comprising medication counselling, patient education on diet and exercise and weekly telephone/SMS reminders. Counselling assessed adherence, addressed barriers, reviewed medications and reinforced persistence. Education promoted lifestyle modifications, including the DASH diet, weight management, physical activity, alcohol reduction and smoking cessation, delivered face-to-face monthly. Weekly BP readings were recorded for all participants over six months. Completed questionnaires were collected by pharmacists after verification. The structured intervention aimed to improve adherence, facilitate lifestyle modification and enhance patient satisfaction among hypertensive adults in community pharmacy settings

Instrument for Data Collection

Patient perception of pharmacy services was evaluated using a modified questionnaire adapted from Al-Arifi (2012)[6]. The instrument consisted of six yes/no questions. Responses were coded as YES = 1 and NO = 0 and the percentage of participants responding YES was computed for each question and compared between baseline and the end of the

study. Client satisfaction was assessed using a questionnaire adapted from Marfo *et al*. (2017)[28], comprising eight items, three negatively worded and five positively worded. Responses were rated on a four-point scale. For questions 1, 2 and 4: Most of the time = 1, Some of the time = 2, Very rarely = 3, Never = 4. For questions 3, 5, 6, 7 and 8: Most of the time = 4, Some of the time = 3, Very rarely = 2, Never = 1. Total scores ranged from 8 to 32, with higher scores indicating higher levels of satisfaction. Medication adherence was assessed using the MARS-5, a validated self-report instrument. Responses were rated on a five-point scale: 5 = Never, 4 = Rarely, 3 = Sometimes, 2 = Often, 1 = Always. Total scores ranged from 5 to 25, with higher scores indicating better adherence.

Data Analysis

Data were analyzed using the Statistical Package for the Social Sciences (SPSS) version 25.0; IBM, USA. Descriptive statistics, including frequencies, percentages, means and standard deviations, were computed to summarize participants' demographic and clinical characteristics. Differences between the intervention and control groups for continuous variables were assessed using independent samples t-tests, while paired t-tests were applied to evaluate within-group changes over time. For categorical variables, between-group differences were examined using the Chi-square test or Fisher's exact test, as appropriate. Statistical significance was set at $p < 0.05$ for all analyses.

Data Analysis and Results

A total of 268 patients were approached for participation during the six-month recruitment period. Of these, 249 patients provided consent and completed the follow-up, resulting in a response rate of 93%. This high response rate reflected strong participant engagement and suggested that the study procedures were well-received within the community pharmacy setting.

Table 1: Baseline socio-demographic data of participants (N = 249)

Characteristics	Total= 249		Control Group = 121		Intervention Group = 128		P-value
	N	(%)	N	(%)	N	**(%)**	
Age of Participants							
18- 27	5	2.0	1	0.8	4	3.1	0.747
28- 37	19	7.6	11	9.1	8	6.3	
38- 47	63	25.3	29	24.0	34	26.6	
48- 57	94	37.8	46	38.0	48	37.5	
58- 67	42	16.9	22	18.2	20	15.6	
>68	26	10.4	12	9.9	14	10.9	
Gender of Participants							
Male	111	44.6	58	47.9	53	41.4	0.300
Female	138	55.4	63	52.1	75	58.6	
Marital Status							
Single	65	26.1	28	23.1	37	28.9	0.196
Married	155	62.2	82	67.8	73	57.0	
Widowed/divorced	29	11.6	11	9.1	18	14.1	
Education Status							
No informal education	16	6.4	6	5.0	10	7.8	0.110
Primary	45	18.1	29	24.0	16	12.5	
Secondary	103	41.4	46	38.0	57	44.5	
Tertiary	85	34.1	40	33.1	45	35.2	
Occupation							
Teaching	29	11.6	13	10.7	16	12.5	0.607
Farming	17	6.8	7	5.8	10	7.8	
Business	103	41.4	53	43.8	50	39.1	
Civil servant	59	23.7	25	20.7	34	26.6	
Others	41	16.5	23	19.0	18	14.1	
Family History of Hypertension							
Yes	146	58.6	79	65.3	67	52.3	**0.038**
No	103	41.4	42	34.7	61	47.7	
Duration of Hypertension							
1-5 years	70	28.1	32	26.4	38	29.7	0.680
6-10 years	158	31.3	80	66.1	78	32.1	
Above 10 years	21	4.8	9	7.4	12	9.4	
Number of Medications Taken							
One	27	10.8	12	9.9	15	11.7	0.376
Two	161	64.7	78	64.5	83	64.8	
Three	45	18.1	20	16.5	25	19.5	
More than three	16	6.4	11	9.1	5	3.9	
Name of Medication							
No	59	23.7	34	28.1	25	19.5	0.112
Yes	190	76.3	87	1.9	103	80.5	
Taking Herbal Preparation							
No	198	79.5	92	76.0	106	82.8	0.185
Yes	51	8.8	29	24.0	22	17.2	

Blood Pressure Control							
Controlled	0	0	0	0	0	0	-
Uncontrolled	249	0	121	100	128	100	-
Descriptive Statistics at Baseline							
Systolic blood pressure (mean-SD)	149.0	7.1	145.8	5.6	152.0	7.2	0.000
Diastolic blood pressure (mean-SD)	93.2	7.6	90.1	6.3	96.1	7.6	0.000

SD: Standard Deviation (Bold Figures are Significant at $p < 0.05$).

Analysis of Table 1 showed that the study included 249 hypertensive patients, with 121 in the control group and 128 in the intervention group, demonstrating a largely balanced distribution of socio-demographic characteristics. Participants' ages ranged widely, with the largest proportion aged 48-57 years (37.8%). No significant differences in age distribution were observed between groups ($p = 0.747$). Gender distribution indicated a slight female predominance (55.4%), but this was not statistically significant ($p = 0.300$). Marital status was similar across groups, with most participants being married (62.2%), followed by single (26.1%) and widowed/divorced (11.6%; $p = 0.196$). Educational attainment varied, with secondary education most common (41.4%), followed by tertiary (34.1%) and primary (18.1%) and distributions were comparable between groups ($p = 0.110$). Occupation was diverse, dominated by business (41.4%) and civil service (23.7%), with no significant group differences ($p = 0.607$). A notable exception was family history of hypertension, which was reported more frequently in the control group (65.3%) than in the intervention group (52.3%, $p = 0.038$). Clinical characteristics, including duration of hypertension, number of medications, use of prescribed antihypertensives and intake of herbal preparations, were similar between groups ($p > 0.05$), indicating baseline clinical homogeneity.

All participants had uncontrolled blood pressure at baseline. However, baseline systolic and diastolic pressures were significantly higher in the intervention group (152.0 ± 7.2 mmHg and 96.1 ± 7.6 mmHg) compared to the control group (145.8 ± 5.6 mmHg and 90.1 ± 6.3 mmHg; $p < 0.001$). These findings confirmed that, while socio-demographic and most clinical characteristics were balanced, the intervention group had a higher initial blood pressure burden, providing a clear benchmark for evaluating the effects of pharmacist-led care in subsequent analyses.

Table 2: Commonly Prescribed Antihypertensive medications

Drug class	**Total = 249**		**CG = 121**		**IG = 128**	
	N	%	N	%	N	%
Angiotensin-converting enzyme inhibitors	150	60.2	67	55.4	83	64.8
Angiotensin II receptor antagonists	54	21.6	29	23.9	25	19.5
Beta-blockers	39	15.7	19	15.7	20	15.6
Calcium channel blockers	210	84.3	98	80.9	112	87.5
Central alpha2 antagonist	13	5.2	7	5.7	6	4.6
Diuretics	124	49.7	60	49.5	64	50

CG - Control Group; IG - Intervention Group

Analysis of Table 2 showed that calcium channel blockers (CCBs) were the most commonly prescribed antihypertensive agents, with 84.3% of participants receiving this class (80.9% in the control group and 87.5% in the intervention group). Angiotensin-converting enzyme inhibitors (ACEIs) were also widely used, prescribed to 60.2% of participants, followed by diuretics (49.7%), angiotensin II receptor antagonists (21.6%), beta-blockers (15.7%) and central alpha-2 agonists (5.2%). The distribution of antihypertensive drug classes was largely similar between the control and intervention groups, indicating comparable pharmacological management at baseline. The predominance of CCBs and ACEIs aligns with current hypertension treatment guidelines in Nigeria, which recommend these classes as first-line therapy for primary blood pressure control and for patients with additional cardiovascular risk factors. Overall, these findings suggest that both groups received standard-of-care antihypertensive therapy prior to the intervention, providing a consistent baseline for evaluating the impact of pharmacist-led care.

Perception of pharmacy services and interventions among patients with hypertension

Table 3: Changes in perception across time points (within/between groups)

Time point	**CG Mean (SD)**	**CG XD**	**P-value**	**IG Mean (SD)**	**IG XD**	**P-value**	**CG - IG**	**P-value**
Baseline[a]	69.7 (17.6)	- 9.1	**0.000**	78.7 (14.6)	-7.4	**0.000**	-9.1	**0.000**
6 months[b]	78.8 (14.9)			86.1 (12.3)			-7.3	**0.000**

CG- control group. IG- intervention group. XD - mean difference - (a minus b), SD- standard deviation (Bold figures are significant at $p < 0.05$).

Analysis of Table 3 showed significant improvements in patient perception scores over six months in both groups. The mean score of control group increased from 69.7 ± 17.6 at baseline to 78.8 ± 14.9 at six months (mean difference = 9.1, $p < 0.001$), while the intervention group improved from 78.7 ± 14.6 to 86.1 ± 12.3 (mean difference = 7.4, $p < 0.001$). Between-group comparisons revealed that the intervention group consistently had higher perception scores than the control group at both time points, with a significant difference of 7.3 points at six months ($p < 0.001$). These findings indicate that pharmacist-led interventions effectively enhanced patients' perception of care

Table 4: Changes in satisfaction across time points (within/between groups)

Time point	CG Mean (SD)	CG XD (a-b)	P-value	IG Mean (SD)	IG XD (a-b)	P-value	CG - IG	P-value
Baseline[a]	75.1(7.8)	-3.8	**0.000**	80.8(6.5)	-0.2	-0.609	- 5.7	**0.000**
6 months[b]	78.9(7.6)			81.0(6.8)			-.2.1	**0.000**

CG- control group. IG- intervention group. XD - mean difference - (a minus b), SD- standard deviation (Bold figures are significant at $p < 0.05$).

Analysis of Table 4 showed that patient satisfaction improved in both groups over six months. The control group's mean satisfaction score increased from 75.1 ± 7.8 at baseline to 78.9 ± 7.6 at six months (mean difference = 3.8, $p < 0.001$), while score slightly increased in the intervention group from 80.8 ± 6.5 to 81.0 ± 6.8 (mean difference = 0.2, $p = 0.609$). Between-group comparisons indicated that the intervention group consistently had higher satisfaction scores than the control group, with a significant difference of 5.7 points at baseline ($p < 0.001$). These findings suggest that pharmacist-led interventions maintained higher patient satisfaction over time.

Discussion of Findings

The study recruited 249 hypertensive patients, with 121 in the control group and 128 in the intervention group. Age distribution was similar between groups, with most participants aged 48-57 years. Females represented 55.4% of the sample. Marital status, education and occupation were balanced between groups, although the control group had a higher proportion reporting a family history of hypertension (65.3% versus 52.3%, $p = 0.038$). Clinical characteristics, including duration of hypertension, number and type of antihypertensive medications and use of herbal preparations, were comparable. Baseline systolic and diastolic blood pressures were higher in the intervention group (152.0 ± 7.2 mmHg; 96.1 ± 7.6 mmHg) than in the control group (145.8 ± 5.6 mmHg; 90.1 ± 6.3 mmHg; $p < 0.001$). The similarity in socio-demographic and clinical characteristics, apart from blood pressure and family history, provides a foundation for assessing the impact of pharmacist-led interventions. These baseline characteristics align with observations by Ayogu *et al*. (2023) and Nwakile *et al*. (2023)[10, 31], who reported comparable distributions in multi-center hypertension studies in Nigeria. Calcium channel blockers (84.3%) and angiotensin-converting enzyme inhibitors (60.2%) were the most commonly prescribed antihypertensives. Other classes such as diuretics, angiotensin II receptor antagonists, beta-blockers and central alpha-2 agonists, were less frequently used. No significant differences in medication types were observed between groups, indicating that subsequent outcome differences are unlikely to be influenced by pharmacological variation. The prescription patterns observed correspond with Nigerian treatment guidelines for primary hypertension and match findings by Adisa, Ilesanmi and Fakeye (2018)[3], who reported similar drug utilization in tertiary hospital settings.

The intervention group increased from 78.7 ± 14.6 to 86.1 ± 12.3, while the control group rose from 69.7 ± 17.6 to 78.8 ± 14.9. Between-group differences at six months favored the intervention group by 7.3 points ($p < 0.001$). These results suggest that structured pharmacist interventions, which included counselling, education and follow-up reminders, enhanced patients' perception of pharmacy services. Previous studies, including Erah and Chuks-Eboka (2008) and Aderemi-Williams *et al*. (2017)[2, 16], reported that patient interactions with pharmacists influence perceived quality of care and support adherence, though their work was limited to tertiary hospitals or urban teaching settings. The present study extends these findings to community pharmacy settings in Uyo Metropolis, confirming that direct pharmacist engagement improves perception even outside hospital environments.

Patient satisfaction increased modestly in both groups, with the intervention group maintaining higher satisfaction scores (81.0 ± 6.8) than the control group (78.9 ± 7.6) at six months. Satisfaction remained relatively stable in the intervention group, indicating that structured counselling preserved patient confidence in pharmacy services. These outcomes are consistent with findings from Apedzi and Apedzi (2024) and Oluwole *et al*. (2019)[9, 34], who demonstrated that sustained pharmacist engagement supports patient satisfaction, which is linked to adherence and treatment outcomes. Medication adherence improved markedly in the intervention group. Baseline adherence scores of 73.4 ± 15 increased to 92.7 ± 10.5 at six months, whereas the control group showed smaller gains (69.1 ± 18.7 to 76.2 ± 19.6). Between-group differences reached 16.5 points ($p < 0.001$), reflecting the effectiveness of pharmacist-led interventions. The use of weekly follow-ups, counselling on diet and exercise and adherence reminders contributed to this outcome. These results are consistent with the trials reported by Ayogu *et al*. (2023) and Ukoha-Kalu, Adibe and Ukwe (2021)[10, 43], which documented similar adherence improvements following structured pharmacist interventions in Nigerian hypertensive populations. The findings showed that routine pharmacy care alone is insufficient to achieve optimal adherence levels.

Conclusion

The study found that structured pharmacist-led interventions in community pharmacies improved patient perception and maintained high satisfaction levels among hypertensive adults. Participants who received counselling, lifestyle education and regular follow-ups demonstrated higher medication adherence compared to those receiving standard care. The results indicate that integrating structured pharmacist interventions into community pharmacy practice can strengthen adherence, optimize therapy and enhance patient confidence in pharmacy services, indicating the practical value of pharmacists in supporting long-term hypertension care and promoting safer, more effective management in urban Nigerian settings.

Recommendations

Based on the findings of the study, the following recommendations were made:

1. Community pharmacies should implement structured pharmacist-led counselling, education and follow-up programs to improve adherence and patient outcomes in hypertension management.
2. Pharmacists should routinely monitor for and address drug-related problems, including dosing errors, side effects and non-adherence, to enhance medication safety.
3. Health authorities should support training and resource allocation for community pharmacists to expand patient-centered services and strengthen hypertension care in urban settings.

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