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Cross-Sectional Survey of Written Medicine Information Use, Health Literacy and Adherence among Hypertensive Patients in Southwest Nigeria

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ABSTRACT

Introduction: Hypertension is the leading risk factor for cardiovascular and kidney disease in Nigeria and significantly contributes to morbidity and mortality. In spite of available, safe and efficacious medicines, diagnosis, initiation of treatment, and treatment outcomes are still suboptimal in Nigeria. Only 29% are diagnosed, 12% are being treated and 2.8% at treatment goals. This study aimed to investigate how hypertensive patients in Southwest Nigeria use written medicine information (WMIs) and their impact on adherence to medicine use.

Methods*:* This was a cross-sectional survey among hypertensive patients living in Southwest Nigeria. The survey tool used was pre-validated (Cronbach alpha 0.774); it elicits demographic information and research questions on behaviour, experience, knowledge of medicine for hypertension and adherence. The population was systematically sampled (every X+1th patient) for qualified respondents. The data were summarised using descriptive statistics and analysed with a chi-square test for categorical outcomes. Microsoft Excel and SPSS v29 were used for the analysis of the data. The study was approved and given oversight by the Health and Research Ethics Committee of the Lagos University Teaching Hospital, Idi-Araba.

Results: Most of the respondents (72.6%) in the study reported having seen a WMI in the past three months, with a majority (61.7%) reporting that they opened it up to read it. Fewer respondents however identified that they always opened the WMI to read if they were getting the medicine for the first time (6.1%), had got it more than once (8.9%) or the WMI had been used in the counselling session (15.4%). Most of the respondents reported having a positive experience with WMIs. The relationship between patient's adherence score to age, their preferred information source, behaviours and impact (except for impact of WMIs on information seeking behaviour) was statistically significant ($p < 0.05$).

Conclusion: This study shows that across the four states, patient experience with WMIs was largely positive, though moderated by poor health literacy and inadequate adherence to medicines.

Introduction

Hypertension is a leading risk factor for cardiovascular and kidney disease in Nigeria, and globally. Its prevalence has been reported to be on the increase over the past few decades- with age adjusted prevalence rising from 8.6% in 1995 to 32.5% in 2020. Current estimates of prevalence range from 22% to 44%, with evidence of increasing prevalence due to urbanization, adoption of a western, sedentary lifestyle and consumption of mostly energy dense meals.[1,2] The highest prevalence of hypertension in Nigeria is in the South East (33.3%), and lowest in the Northeast (24.7%). The Southwest is however close with a prevalence of 30.2% (95% CI 23.6 to 36.8). The prevalence was not significantly different between women and men, but higher among urban than rural dwellers. It is reckoned that there are likely more than 30 million Nigerians over the age of 19 living with hypertension currently.[3]

Importantly, there is evidence that in spite of available, safe and efficacious medicines, diagnosis, initiation of treatment, and treatment outcomes are still sub-optimal in Nigeria. Only 29% are diagnosed, 12% are being treated and 2.8% at treatment goals.[3] Some studies have attributed the gaps through socio-ecological modelling to five main levels of determinants, individual, interpersonal,

institutional, community and public policy. With the lowest hanging fruit being at the individual level where aligned health beliefs, knowledge and increased personal levels of control may result in improved health action-taking behaviours.

Patient-related Barriers to Blood Pressure Control

Many factors contribute to the poor medication adherence we see with patients living with high blood pressure. Including patients' beliefs about hypertension and its treatment, mental health problems, cognitive dysfunction, low health literacy, comorbidities, patient motivation, coping, and lack of social support are all patient-related barriers to controlled BP. The most important of these is poor medication adherence, since it plays a central role in how other problems may develop over time. Measures of medication adherence among hypertensive patients vary widely depending on the tool chosen, but is often sub-optimal in the population. In the first year alone, up to half of all patients that begin pharmacotherapy for hypertension discontinue their medications. However, there is clinical evidence to show that patients who use their medication as prescribed for longer term have improved BP control and reduced complications.[4,5]

There's already evidence linking poor adherence to medicines to poor outcomes and increased morbidity and mortality in the hypertensive patient.[4-6] And what patients do, is often related to their health beliefs and their health literacy. People living with hypertension therefore make their decisions to take their medicines (or not to take them), based what they consider the most correct information at that time. It then follows that if the patient can be informed and provided adequate information, they are more likely to continue to act in accordance with the recommended course of action prescribed by their healthcare provider. The most important tool for achieving that health literacy is education, verbal and written forms of health education (WMIs).[4]

Written Medicine Information (WMIs) Tools

Written medicine information tools like the patient information leaflet (PILs) are standardized tools designed to provide essential information about a drug's usage, dosage, potential side effects, and precautions. They guide the patient in the safe, and effective use of the medicinal product to reach agreed goals with their healthcare providers. WMIs are intended to inform, educate, serve as reminders, guide and support the patient to make informed decisions about their medicine in the absence of their healthcare provider. Especially in the chronic disease patient, WMIs empower the patient by providing information in a readable, digestible format that enables them take decisions independently. Properly used, WMIs will improve patient understanding of their medicines, support safe use of medicines independently and promote medicine adherence.

In Nigeria, the rules for WMIs (like PILs) are regulated by National Agency for Food and Drugs Administration and Control in Nigeria (NAFDAC). They stipulate the minimum standards tenable for pharmaceutical companies providing individual packs of medicines and those in larger hospital packages.

This study aimed to investigate how hypertensive patients in Southwest Nigeria use WMIs, assess their experiences with commercially available WMIs, and evaluate the impact of these materials on their knowledge of hypertension medications and adherence to treatment.

Methods

Research Location and Setting

A survey was carried out among hypertensive patients in the four of the six states of SouthWest Nigeria (Sango-Ota, Ogun State, Ibadan, Oyo State, Ido-Ekiti, Ekiti and Akure, Ondo State. The hypertension clinics at these hospital were selected to facilitate the sampling of representative members of the target communities.

Table1: Selected Hospitals in SouthWest Nigeria where sampling was done

	Hospital	Bed capacity	Category
1.	Covenant University Health Centre, Sango-Ota, Ogun State	70 beds	Secondary Healthcare facility
2.	Adekunle Fajuyi Military Hospital, Ibadan, Oyo State	300 beds	Secondary Healthcare facility
3.	Federal Teaching Hospital, Ido-Ekiti, Ekiti State	600 beds	Tertiary Healthcare facility
4.	Federal Medical Centre, Owo, Ondo State	350 beds	Tertiary Healthcare facility

Research Design

The study was designed as an analytical cross-sectional survey of hypertensive patients living in South West Nigeria.

Research material/ tools

The survey tool was developed by the researcher through literature review, and face validation was carried out by an expert. The tool was then validated through a test-retest with 124 hypertensive patients at Palm Avenue Primary Health Centre, Mushin, Lagos State. The researchers obtained a Cronbach alpha calculated (0.773); suggestions at this stage were implemented to improve readability.

The survey tool consists of four main parts, including an initial part eliciting sociodemographic data of the respondents:

- questions on how patients use WMIs (including their information seeking behaviour)
- questions on patient's experience using WMIs,
- questions about knowledge of medicine for hypertension, and
- questions to elicit patient's adherence to medicine use.

The survey tool was administered between October 2023 to January 2024. Respondents who received the questionnaire were encouraged to fill and return before leaving the hospital/ clinic during their appointment.

Sample size

A sample size of 384 study participants was calculated for this study at a 95% level of confidence, 5% margin of error and estimated prevalence at 50%.[7]

Eligibility Criteria

Inclusion criteria: patients diagnosed with hypertension in a hospital, aged 18 or older, using at least one anti-hypertensive medication for at least 6 months.

Exclusion criteria: patients who are not ambulatory, or who have a comorbid condition for which they are taking a medicine. The researchers decided to restrict these patients since their care will introduce confounders into the effects being understudied.

Sampling

On the clinic day, every other eligible participant ((X+1) th patient) was then systematically chosen as a qualified respondent to ensure randomness. Qualified respondents were provided a research information sheet and indicated a willingness to participate by signing the consent form before filling the survey tool.

Data Extraction

All forms were anonymised and the data transcribed to an excel data sheet. The forms were all retrieved by the researcher and stored securely.

Data analysis

Data collected was checked for completeness and pre-analysed using the Microsoft Excel®. The entire database was then exported to SPSS version 29 for further analysis. Descriptive analysis (frequency, percentages, means and mode) was employed to summarise the participants' sociodemographic characteristics. Relationships between variables were investigated using the Chi square test statistic.

Ethical consideration

Ethical approval was obtained from the Health and Research Ethics Committee of the Lagos University Teaching Hospital, Idiaraba, Lagos: ADM/DCST/HREC/APP/6126 dated 5th October 2023.

Results's sociodemographic characteristics are as shown in Table 1. The mean age class was 36-55 year olds. There were more female respondents 53.65%) in this study, with the highest difference seen in Ogun state (59%) and the reverse in Oyo state (44.1%).

All respondents could at least read in English, and most of them had completed a formal education. About half of the respondents reported using a healthcare professional as a preferred source of medicine information, followed by Written Medicine information (29.2).

Most of the hypertensive patients that responded were from Ogun state, while the least number of respondents were recruited from Ekiti state.

Table 2: Demographic Data on Hypertensive Respondents in SouthWest Nigeria

VARIABLE	UNITS	n(%)
Age (years)*	18-35	28 3 (25.6)
	36-55	520 (29.1)
	55+	301 (10.9)
Sex	Male	510 (47.35)
	Female	567 (52.65)
States of residence	Ogun state	421 (70.1)
	Ondo state	182 (72.8)
	Oyo state	373 (93.3)
	Ekiti state	151 (75.6)
Education Level	I can Read and write in English	258 (1.8)
	Secondary School LC	376 (5.5)
	Diploma/ Bachelors	332 (1.8)
	PostGraduate	89 (10.9)
	Others	49 (63.6)
Medicine information sources	Internet	123 (11.1)
	Pharmacist	565 (51.1)
	Written Medicine Information	323 (29.2)
	Family	95 (8.6)
	Others	0

Table 3: Behaviour: How did hypertensive patients in SouthWest Nigeria use WMIs?

Most of the respondents (72.6%) in the study reported having seen a WMI in the past three months, with a majority (61.7%) reporting that they opened it up to read it. Fewer respondents however identified that they always opened the WMI to read if they were getting the medicine for the first time (6.1%), had got it more than once (8.9%) or the WMI had been used in the counselling. session (15.4%).

VARIABLE	UNITS	n(%)
Have you seen a PIL in the last 3 months?	Yes	727 (68.9)
	No	261 (24.7)
	Not sure	68 (6.4)
What did you do with the PIL	I opened the insert to read	653 (61.7)
	I threw it away	283 (26.8)

	I did not see a medicine insert in the package	79 (7.5)
	I could not read the information (not in English)	25 (2.4)
	I could not read the information (other reasons)	18 (1.7)
First time getting a PIL	Always	67 (6.1)
	Often	117 (10.6)
	Sometimes	327 (29.5)
	Rarely	267 (24.1)
	Never	330 (29.8)
Getting a PIL repeatedly	Always	94 (8.9)
	Often	206 (19.6)
	Sometimes	315 (29.9)
	Rarely	298 (28.4)
	Never	138 (13.1)
Getting counselled with a PIL	Always	170 (15.4)
	Often	203 (18.3)
	Sometimes	368 (32.2)
	Rarely	223 (20.2)
	Never	143 (12.9)

Table 4: Experience of hypertensive patients using WMIs in SouthWest Nigeria

Most of the respondents reported having a positive experience with WMIs; most at least agree that they were able to read and understand the WMIs they'd seen (64.9%), that the WMIs were written in a language that they could read fluently (62.3%), contained relevant information to them (61.7%), was written in non-technical conversational words (56.2%), contained information that they could implement immediately (54.8%), contained enough information to assist with decision-making (63.9%), communicated information on side effects effectively (52.3%), was reliable (52.6%), and complimented what my doctor told me (66.6%).

VARIABLE	**LIKERT SCALE (FREQUENCY)**				
	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
No difficulty	286	441	249	91	52
Language	219	476	252	121	48
Local Language	71	211	313	344	174
Technical	118	283	309	301	97
Pictogram	105	357	353	221	72
Relevance	132	548	327	63	33

Conversational	160	463	320	118	48
Implementable	141	470	380	98	26
Decision - Assist	252	454	252	103	44
ADEs	181	389	319	139	62
Reliability	149	390	279	122	84
Complementary	296	429	247	78	39

Table 5: Impact of reading WMIs on knowledge and use of medicines among Hypertensive Patients in SouthWest Nigeria

More than half of respondents reported that the WMI changed their understanding of their medicines, while 17.4% reported that reading the WMI changed the way they used their medicine, and 15.4% reported asking for more information.

VARIABLE	LIKERT SCALE	FREQUENCY (%)
Change Understanding	Yes	616
	No	408
	Maybe	88
Change use	Yes	194
	No	606
	Maybe	315
Ask for information	Yes	170
	No	563
	Maybe	368

Table 6: Information about medicines that hypertensive patients in SouthWest Nigeria were most interested in
Most of the respondents reported looking for information about side effects of medicines (75.3%), and how to use their medicine (51.3%).

VARIABLE	FREQUENCY (%)
Side effects	843 (75.3)
How to use the medicine	574 (51.3)
What the medicine is used for (Indications)	101 (9.0)
Effectiveness	224 (20.0)
Importance	138 (12.3)
Information	102 (9.1)
Interactions	88 (7.9)
Contraindications	96 (8.6)
Alternatives	27 (2.4)
Expiry date	11 (0.9)

Table 7: Medicines used by patients for hypertension across SouthWest Nigeria

The most commonly prescribed antihypertensive among surveyed respondents was the clcium channel blocker Amlodipine, followed closely by the angiotensin converting enzyme inhibitor Lisinopril. In effect most of the prescriptions reported had six (6) classes of antihypertensive medicines- calcium channel blockers, ACE Inhibitors, ARBs, Centrally acting alpha-2 agonist, diuretics and beta blockers.

VARIABLE		FREQUENCY (%)
Pharmacological Class	**Pharmaceutical product**	
Calcium channel blockers	Amlodipine	344
	Nifedipine	95
ACE Inhibitors	Lisinopril	298
	Ramipril	106
	Perindopril	12
	Captopril	153
Angiotensin II Receptor Blockers	Valsartan	93
	Losartan	84
	Telmisartan	104
Centrally acting alpha-2 agonist	Methyldopa	286
Diuretics	Amiloride/ Hydrochlorthiazide	203
	Hydrochlorthiazide	68
	Indapamide	32
	Furosemide	17
	Spironolactone	58
Beta Blockers	Propranolol	15
	Carvedilol	32
	Nebivolol	72
	Atenolol	108
	Metoprolol	49

Table 8: Scored Knowledge of Hypertension Medicines among Hypertensive Patients in SouthWest Nigeria

Only a small proportion of respondents in this study achieved a good knowledge of hypertension medicines score overall (11.7%), with participants from Oyo State recording the highest percentage of 'good' scores (24.9%) on the knowledge scale among the four states.

VARIABLE	UNIT [FREQUENCY (%)]		
	Good	Average	Poor
Ogun state	21	259	141
Oyo state	93	178	103
Ondo state	7	16	159
Ekiti state	11	25	117
Total	132	478	520

Table 9: Medicine Adherence among Patients with Hypertension in SouthWest Nigeria

Self reported adherence to medicine in the last six months was highest in Ekiti state ('good' 21.4%) and lowest in Ogun state ('good' 7.8%).

VARIABLE	ADHERENCE SCORE [FREQUENCY (%)]		
	Good	Average	Poor
Ogun state	31	275	94
Oyo state	36	141	105
Ondo state	22	96	31
Ekiti state	22	59	22
Total	111	571	252

Table 10: Inferential data on Behaviour, impact and score of knowledge among Hypertensive Patients in SouthWest Nigeria

The table presents the results of a chi-square test analyzing the relationship between various factors and computed adherence scores. Significant associations ($p<0.001$) were found for most variables, particularly age, preferred information source, medicine use, and knowledge of hypertension medicines.

VARIABLE	INFERENTIAL			
	AGE	SEX	EDUCATION LEVEL	PREFERRED MEDICINE INFORMATION SOURCE
What Patients Report Doing with WMIs	22.045 (p=.005)	2.679 (p>0.05)	56.655 (p<0.001)	40.593 (p<0.001)
Behaviour when Patients First r eceive a WMI	28.796 (p<0.001)	6.057 (p>0.05)	82.718 (p<0.001)	38.431 (p<0.001)
Behaviour when Patients receives a WMI on repeat visit	45.239 (p<0.001)	12.043 (p>0.05)	76.255 (p<0.001)	18.733 (p>0.05)
Behaviour when Patients receive a WMI after counselling session	8.219 (p>0.05)	12.534 (p>0.05)	76.044 (p<0.001)	36.994 (p<0.001)
Impact of WMI on Understanding of Medicines for Hypertension	8.657 (p>0.05)	2.325 (p>0.05)	24.407 (p=0.002)	27.261 (p<0.001)
Impact of WMIs on Medicine Use	4.812 (p>0.05)	6.050 (p>0.05)	31.078 (p=0.002)	26.809 (p=0.002)
Impact of WMIs on Information seeking behaviour	16.844 (p<0.05)	10.783 (p>0.05)	18.947 (p>0.05)	21.484 (p<0.05)
Score of Knowledge of Medicine for Hypertension	14.826 (p<0.005)	2.254 (p>0.05)	50.938 (p<0.001)	42.162 (p<0.001)

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Score of Knowledge of Medicine for Hypertension	14.826 (p<0.005)	2.254 (p>0.05)	50.938 (p<0.001)	42.162 (p<0.001)

Table 11: Inferential data on variables and adherence to medicine use among Hypertensive Patients in SouthWest Nigeria

The relationship between patient's adherence score to age, their preferred information source, behaviours and impact (except for impact of WMIs on information seeking behaviour) was statistically significant.

VARIABLE	ADHERENCE SCORE [CHI SQUARE TEST (pValue)]
Age	29.854 (p<0.001)
Preferred Information Source	32.773 (p<0.001)
Behaviour when Patients First receives a WMI	33.677 (p<0.001)
Behaviour when Patients receive a WMI on repeat vi	37. 924 (p<0.001)
Behaviour when Patients receive a WMI after counselling session	25.066 (p<0.05)
Impact of WMI on Understanding of Medicines for Hypertension	24.636 (p<0.001)
Impact of WMIs on Medicine Use	47.862 (p<0.001)
Impact of WMIs on Information seeking behaviour	17.051 (p>0.05)
Score of Knowledge of Medicines for Hypertension	576.816 (p<0.001)

Discussion

Findings in this study show that majority of the respondents are aware of the WMIs however, there still exists a gap to be filled, with upto 1 in 3 of the respondents reporting they have not seen one in the last 3 months (Table 2). This is concerning since providing a WMI in the package of medicines is mandatory as per the regulatory provision in Nigeria. Meaning at least one in three individuals do not get the additional benefits from having a reference guide for their medicine use. There could however be multiple points of failure in this case, including at the packaging point, and at the dispensing point (if medicine has been repacked from a dispensing lot).

How hypertensive patients use WMIs

The findings highlight several important trends regarding patient exposure to and utilization of WMIs (Table 2). A majority of respondents (68.9%) reported encountering a WMI in the past three months, this suggests that WMIs are widely distributed with medications. However, there are still gaps in distribution or patient awareness since about a quarter of the respondents did not receive one. Similarly, about one in four patients reported discarding the WMI without reading it. This finding is similar to prior studies suggesting that patients often overlook medication leaflets believing that they are complex, irrelevant, or hard to understand.[8]

Less than one in ten respondents in this study report reading a WMI all the time if they are receiving it for the first time, or have received it more than once. However, this engagement doiubles when respondents have been counselled by their healthcare provider with the WMI as a tool. These findings suggests that the patients are not as engaged with the PILs that come with their medicines as they are intended or designed to be, and this represents a missed opportunity for reinforcing safe and effective medicine use. Given that WMIs are intended to supplement verbal instructions, these findings suggest a need for improved integration of WMIs into patient education strategies. While there is evidence that WMIs are widely available, their utilization remains inconsistent. Strategies such as simplifying WMI language, increasing pharmacist engagement, and incorporating digital or visual alternatives may enhance patient comprehension and adherence.[9] Interventions to integrate counselling with WMIs into routine practice are needed, and by addressing these gaps, we would be optimizing for medication safety and therapeutic efficacy.

Experience of Hypertensive Patients using WMIs

Most of the respondents found the WMIs accessible since they all reported being able to read in English. However, there were still a few gaps seen in this study across all the variables, for example, a minority (12.8%) of respondents struggled with comprehension even though they reported they had seen a WMI written in a language they could read recently, and some (35.6%) patients reported that WMIs contained technical terms that made it diffcult to understand. These gaps may be due to several factors including those related to the patients (low health literacy, individual locus of control, health beliefs, cultural norms and beliefs, family status, socioeconomic status and other individual variations), the healthcare professional (skill of the professional, time alloted for counselling, ability to empathize with patients, communication skills, etc), the health system (structural issues like distance, space for counselling, the presence of adequate staff, and policy issues like standard operating procedures, health financing (e.g. health insurance and drug revolving fund), staff training, and other intangible services like contact follow-up and tracing, language interpretation services. health insurance low health literacy in Nigeria, individuals that have access to the WMIs may still be unable to understand the text where it contains medical terms or references.

Making WMIs more readable by replacing technical terms and references with colloquial words that are relatable for non-native English speakers. There are instances however, where making a WMI more readable may lead to the loss of more specific language and the resulting document is incomplete. There have been significant effort expended to develop pictograms to complement and balance out the use of technical words in the WMIs. This can help retain specific language, while improving readability for users. One gap that was also evident was the lack of decision-support elements within the WMIs, patients want to read a WMI that informs and also engages them with actionable insight.

WMIs were reported to be most impactful on improving understanding of the medicines for hypertension, less so on changing how they use their medicines and less so on motivating the respondents to look for more information. This demonstrates awareness of the informational role of the WMIs, and a good level of understanding that WMIs play a crucial role in patient education. What is missing is the lack of progression from information to decision-support and action. There is also a good number of respondnets who do not have positive responses yet to the WMIs they have been exposed to. There fore, there is a need

for more engaging and interactive WMIs that incorporate pictograms. These WMIs can then be used in counselling sessions by pharmacists in a way that supports, reinforces and provides a succinct reference for patients when they leave the hospital.

Respondents valued information on side effects (75.3%) and how to use their medicine (51.3%), indicating a primary concern for safety and correct administration. This emphasis on side effects supports prior research showing that clear, balanced explanations of adverse reactions can reduce anxiety and improve adherence, while the focus on usage instructions highlights the need for accessible guidance to prevent dosing errors.[8,10] In contrast, the relatively low prioritization of indications (9.0%), effectiveness (20.0%), interactions (7.9%), and contraindications (8.6%) may reflect a reliance on healthcare providers for these aspects or a gap in patient awareness.[11,12] These results underscore the importance of tailoring written medicine information to emphasize practical and safety-related content, while also ensuring that essential clinical details are communicated effectively.[13]

The distribution of antihypertensive prescriptions reflects current prescribing trends and potential influences on treatment choices. The predominance of calcium channel blockers, particularly amlodipine, aligns with the JNC8 guidelines recommending them as first-line agents for hypertension, especially in populations of African descent.[14] ACE inhibitors and angiotensin II receptor blockers (ARBs) are also widely prescribed, but the relatively lower frequency of ARB use compared to ACE inhibitors may indicate prescriber familiarity since access (mainly costs) are now comparable. Methyldopa remains commonly used, likely due to its established role in managing hypertension during pregnancy.[15] Diuretics, particularly hydrochlorothiazide and amiloride combinations, highlight the importance of cost-effective options, but the lower use of loop diuretics like furosemide suggests their restriction to specific clinical indications.[14] The variability in beta-blocker prescriptions, with atenolol being the most frequent, may reflect shifting preferences given concerns about metabolic side effects. These trends underscore the role of clinical guidelines, economic factors, and prescriber habits in shaping antihypertensive therapy choices.[14,16]

Knowledge of medicines for hypertension and Adherence

The distribution of knowledge scores across the four states highlights disparities in health literacy, which may have implications for public health interventions and policy decisions. The relatively higher proportion of "good" scores in Oyo state suggests better awareness or access to health education resources, possibly due to urbanization or targeted health campaigns.[4-6] Conversely, the predominance of "poor" scores in Ondo and Ekiti states may indicate gaps in health communication, limited outreach programs, or socio-economic factors that hinder access to information. The substantial number of respondents with "average" scores across states suggests that while some awareness exists, there is room for improvement in ensuring comprehension and application of health information. These findings emphasize the need for tailored interventions, such as pharmacist-led educational initiatives and simplified patient information leaflets, to bridge the knowledge gap. Addressing regional disparities through community-based strategies may improve health outcomes and medication adherence.[4,5,6,17]

The distribution of adherence scores across the states suggests significant variability in medication adherence, potentially influenced by socioeconomics, healthcare access, and patient education factors.[5,6] Ogun and Oyo states had the highest proportions of respondents in the "average" adherence category, indicating that while patients may recognize the importance of adherence, barriers such as cost, side effects, or forgetfulness may still impact consistency.[18] Patient engagement strategies, such as pharmacist counseling or community-based adherence programs may be effective strategies to increase medicine use persistence.[19] However, the overall high prevalence of "average" adherence across all states highlights the need for targeted interventions, including counselling with WMIs, medication reminders, simplified regimens, and improved communication between healthcare providers and patients.[20] Addressing these factors is essential for optimizing therapeutic outcomes and reducing the burden of poorly managed chronic conditions.[4-6,19,20]

The findings suggest that age and education level significantly influence how patients interact with written medicine information (WMI), while sex appears to have no significant impact. Older patients and those with higher education levels exhibit more engagement with WMI, as reflected in significant p-values for these factors in multiple variables ($p<0.05$ or $p<0.001$). Preferred sources of medicine information also strongly affect WMI use and knowledge scores, reinforcing previous research that highlights the role of trusted healthcare sources in patient education.[21] However, the lack of significance for age and sex in certain areas, such as the impact of WMIs on medicine use and information-seeking behavior ($p>0.05$),

suggests that adherence strategies should be tailored beyond demographic factors. Instead, interventions should focus on improving health literacy and accessibility of WMIs to enhance understanding and behavioral change. Future research could explore qualitative factors, such as cultural beliefs and cognitive load, which can affect the effectiveness of WMIs.[20,21,22]

The results indicate that age and preferred information sources significantly influence adherence behaviors and knowledge of medicines for hypertension ($p<0.001$), aligning with existing literature that highlights the role of demographic and informational factors in patient adherence.[21] Patients' behavior when receiving written medicine information (WMI), whether at first exposure, on repeat visits, or after counseling, also shows a strong statistical association with adherence ($p<0.05$ or $p<0.001$), emphasizing the importance of repeated and structured education. The significant impact of WMIs on medicine use ($p<0.001$) suggests that well-designed WMIs can positively affect adherence, supporting findings by Koster *et al*. (2015) on patient engagement with medication information.[17] However, the non-significant impact of WMIs on information-seeking behavior ($p>0.05$) raises concerns about whether patients actively use WMIs to explore additional information, suggesting a potential gap in health literacy or accessibility of alternative reliable sources. The high chi-square value for knowledge scores (576.816, $p<0.001$) further reinforces the central role of structured WMI in patient education.[22] Future interventions should optimize WMI content and accessibility to improve both adherence and proactive health information-seeking behaviors.

LIMITATIONS TO THE STUDY

This study is limited by the cross-sectional design, as it cannot establish that the observed effects are in fact due to the patient's use of WMIs. It however establishes association between the observed effect and the independent variables. This study recruited mostly educated patients and those who were literate enough to read in English, thereby suffering from the bias that excludes illiterate patients from participating.

The authors attempted to reduce desirability and recall bias by wording questions in a way that patients did not feel one answer was right or more desirable than the other. In spite of these efforts, we do recognize that the research design is limited but practical.

Conclusion

The findings of this study show there are gaps in the distribution, accessibility, and utilization of WMI among patients. While a majority of respondents reported encountering WMIs, a substantial proportion had limited or no exposure, thereby missing out on critical medication-related information. Additionally, inconsistent access to WMIs across various touchpoints—such as first-time exposure, repeated encounters, and counseling—suggests that systemic issues, including distribution inefficiencies and inadequate patient education strategies, need to be addressed to maximize the benefits of WMIs. Patient engagement with WMIs also varied considerably, with some individuals actively reading and utilizing the information while others disregarded it due to perceived complexity or lack of relevance. The study further reveals that counseling significantly enhances the perceived value and utilization of WMIs, reinforcing the importance of integrating verbal guidance with written instructions. Pharmacist-led interventions that incorporate simplified language, pictograms, and interactive elements may enhance patient comprehension, adherence, and informed decision-making regarding their medication regimens.

Despite the availability of WMIs, barriers such as technical jargon, health literacy challenges, and insufficient counseling persist, affecting patient understanding and adherence. The study brings to the fore, the need for more user-friendly, accessible, and engaging WMIs that not only provide information but also facilitate decision-making. Additionally, healthcare providers must adopt a more structured approach to patient education, ensuring that every patient consistently receives and understands WMI content. Future efforts should focus on enhancing health literacy, optimizing WMI design, and reinforcing pharmacist-patient interactions to improve medication safety and therapeutic outcomes.

CONFLICT OF INTEREST

The authors declare that there are no conflicts of interest relevant to this study. No financial, personal, or professional relationships influenced the conduct or reporting of the research. The research was self-funded in its entirety.

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