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Compliance with Non-pharmacological Interventions for the Management of Hypertension among Adult Hypertensive Patients in South-Eastern Nigeria

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ABSTRACT

Background: Hypertension remains a major public health challenge globally and is strongly influenced by modifiable lifestyle factors. Non-pharmacological interventions are central to its prevention and management; however, compliance among hypertensive patients remains variable.

Objectives: This study assessed awareness, compliance, and demographic predictors of non-pharmacological management among adult hypertensive patients in Southeastern Nigeria.

Methods: A cross-sectional study was conducted among 485 hypertensive patients attending tertiary institutions in Anambra, Ebonyi, and Enugu States. Data were collected using pre-tested semi-structured questionnaires. Descriptive statistics were used to summarise variables, while Chi-square tests and logistic regression were used to identify factors associated with compliance. Statistical significance was set at $p < 0.05$.

Results: Overall awareness of non-pharmacological management was high (71.5 %), with the greatest awareness observed for fruit and vegetable consumption and stress reduction. Overall compliance was 62.7 %. Components of physical exercise recorded the lowest adherence rates. Occupation was significantly associated with compliance (AOR = 2.23; 95 % CI: 1.25-3.95; $p = 0.006$). The observed compliance proportion (62.7 %) was significantly higher than the hypothesised 60 % benchmark ($p < 0.001$).

Conclusion: Although awareness of lifestyle modification was high, compliance was moderate, with occupation emerging as a significant predictor. Targeted interventions focused on occupational and behavioural barriers may improve adherence to non-pharmacological hypertension management.

Keywords: Hypertension, Non-pharmacological management, Compliance, Lifestyle modification

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Observance des interventions non pharmacologiques pour la prise en charge de l'hypertension chez les patients adultes hypertendus du sud -est du Nigéria

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RÉSUMÉ

Contexte : L'hypertension artérielle reste un enjeu majeur de santé publique à l'échelle mondiale et est fortement influencée par des facteurs liés au mode de vie modifiables. Les interventions non pharmacologiques sont essentielles à sa prévention et à sa prise en charge ; toutefois, l'observance thérapeutique chez les patients hypertendus reste variable.

Objectifs : Cette étude a évalué la sensibilisation, l'observance et les facteurs démographiques prédictifs de la prise en charge non pharmacologique chez les patients adultes hypertendus du sud-est du Nigéria.

Méthodes : Une étude transversale a été menée auprès de 485 patients hypertendus suivis dans des établissements de soins tertiaires des États d'Anambra, d'Ebonyi et d'Enugu. Les données ont été recueillies à l'aide de questionnaires semi-structurés prétestés. Des statistiques descriptives ont été utilisées pour résumer les variables, tandis que des tests du chi carré et une régression logistique ont permis d'identifier les facteurs associés à l'observance du traitement. Le seuil de signification statistique a été fixé à $p < 0,05$.

Résultats : Le niveau global de sensibilisation à la prise en charge non pharmacologique était élevé (71,5 %), la sensibilisation la plus forte étant observée pour la consommation de fruits et légumes et la réduction du stress. L'observance globale était de 62,7 %. Les composantes de l'activité physique ont enregistré les taux d'observance les plus faibles. La profession était significativement associée à l'observance (aOR = 2,23 ; IC à 95 % : 1,25-3,95 ; p = 0,006). Le taux d'observance observé (63,0 %) était significativement supérieur au seuil de référence de 60 % retenu dans l'hypothèse ($p < 0,001$).

Conclusion : Bien que la sensibilisation aux modifications du mode de vie ait été élevée, l'observance s'est avérée modérée, la profession se révélant être un facteur prédictif important. Des interventions ciblées axées sur les obstacles professionnels et comportementaux pourraient améliorer l'observance de la prise en charge non pharmacologique de l'hypertension.

Mots-clés : Hypertension, prise en charge non pharmacologique, observance, modification du mode de vie

INTRODUCTION

Hypertension is a major global health challenge, affecting over 1.2 billion adults.[1-3] It is a major risk factor for cardiovascular disease, stroke, and kidney failure, contributing to approximately 7.5 million deaths annually.[1,2] The burden of hypertension is particularly severe in low- and middle-income countries, where healthcare resources are often scarce, and the rates of awareness and treatment remain low.[4,5] Although preventable, the prevalence of hypertension is on the rise, and many remain undiagnosed or inadequately treated.[1,6-10] To improve overall health outcomes and reduce healthcare costs, the World Health Organisation (WHO) underscores the importance of early detection, lifestyle modifications, and access to effective treatments to mitigate the impact of hypertension.[1,7,8]

Lifestyle compliance plays an important role in the management of hypertension.[11,12] Adhering to lifestyle modifications, such as dietary changes, regular physical activity, and effective weight management, can improve cardiovascular health and reduce the risk of hypertension-related complications.[13-15] Recent studies indicate that patients who follow lifestyle recommendations experience better blood pressure control and a lower incidence of cardiovascular events. [16-19] The adoption of the DASH (Dietary Approaches to Stop Hypertension) has been associated with notable improvements in blood pressure.[19] Furthermore, engaging in regular physical activity also enhances overall cardiovascular fitness.[11,20] More recent studies emphasize that lifestyle interventions lead to a significant reduction in hypertension across diverse populations, effectively manage blood pressure levels, and enhance the quality of life for hypertensive patients.[17,21-23] However, adherence to lifestyle modifications remains suboptimum.

Adherence to lifestyle modifications is poor globally.[14,24-27] Studies in Ethiopia reported varying levels of adherence, ranging from 28.3 % to 32.8 % of participants.[28,29] A systematic review observed that high consumption of junk food, red meat, and alcohol was associated with increased odds of high blood pressure among Africans.[30] Barriers, such as lack of motivation, support systems, and access to healthcare resources, contribute to poor adherence to lifestyle adjustments.[31, 32] Addressing these barriers is essential for improving adherence and health outcomes among hypertensive patients.

Although there are several Nigeria-wide and southern region studies on adherence to lifestyle modifications or medication adherence, relatively few peer-reviewed studies focus on non-pharmacological (lifestyle) compliance among hypertensive adults in the South-East geopolitical zone, and many existing reports are single-site or not focused on LSM.[33-35] This limits the ability to generalize or design region-appropriate interventions for the South-East. In a multi-setting study, varying factors such as patient beliefs, physician counselling, patient knowledge and gender influenced lifestyle compliance.[36] Other studies from Nigeria showed that although clinical and sociodemographic characteristics play a role in adherence, contextual factors, health systems, and geopolitical differences also influence which factors are significant.[32,37,38] Previous work has shown that studies use different cut-offs/definitions of adherence to non-pharmacological interventions.[33,39,40] Some use ad hoc operationalization rather than use standard national benchmarks. Although there are ongoing benchmarking efforts in high-income countries and large national surveys, wide inter-country variation persists, underscoring both the absence of standardised benchmarks for LSM compliance and the need for them in low-resource settings such as Nigeria.[27,33,40] This study aimed to assess compliance with non-pharmacological intervention for the management of hypertension among adult hypertensive patients in South-Eastern Nigeria.

METHODS

Study Design and Setting

This is a cross-sectional study that assessed the compliance of adult hypertensive patients in South-Eastern Nigeria with the non-pharmacological interventions for the management of hypertension. The study was carried out at three tertiary health institutions in Southeast Nigeria: Nnamdi Azikiwe University Teaching Hospital, Nnewi; University of Nigeria Teaching Hospital, Ituku-Ozalla; and Alex Ekweme Federal Medical Centre, Abakaliki.

Study Population

The study population comprises hypertensive patients attending the clinics at the hospitals mentioned.

Inclusion Criteria

Participants aged 18 years and above, who have at least 3 months of hypertension history and clinic attendance were included.

Exclusion Criteria
History of stroke, inability to provide informed consent, severe cognitive impairment, pregnancy or breastfeeding.

Sampling Technique
Eligible and consenting hypertensive patients attending hospital clinics were randomly recruited for the study.

SAMPLE Size Estimation
Sample size was calculated with a 95 % confidence level and 0.05 precision, based on a prevalence of 16.40 %. [41]

The formula[42] for calculating sample size is

$n = 2Z^2PQ/d^2$ ..... (1)

Where:

n = sample size.

Z = standard normal deviation at 95 % confidence interval, which is 1.96.

d = degree of precision (taken as 0.05).

P = Prevalence.

Q = 1-P

n = 2(1.96)2 (0.164) (0.836)/ $(0.05).^2$

n = 421

An additional 84 (20 %) were added to account for non-responses, bringing the final sample size to 505.[43]

Data Collection
A Semi-structured, pre-tested questionnaire was used for data collection. The tool was adapted from a previous work 44 and has five sections, namely (a) demographics, (b) clinical characteristics, (c) awareness, (d) compliance with non-pharmacological management of hypertension, and (e) smoking experience. Three research assistants were involved in distributing and collecting the questionnaires, and data were collected over 3 months. The principal investigator served as the supervisor, overseeing the process across the three locations.

Data Analysis and Presentation
The retrieved questionnaires were checked for completeness, coded in Microsoft Excel 365 (2024), and then exported to IBM SPSS Statistics (Version 24) for analysis. Descriptive statistics were used to summarise compliance levels by frequency and proportion. To evaluate whether the observed compliance rate differed from a predefined benchmark of 60 %, a one-sample binomial test was conducted, as compliance was dichotomous and the analysis tested a population proportion rather than a continuous mean. The association between variables was assessed using the Chi-square test, and multivariable logistic regression was used to identify independent predictors of compliance. Statistical significance was set at $p < 0.05$ with a 95 % confidence interval.

Ethical Consideration
Ethical approvals were obtained from the University of Nigeria Teaching Hospital Health Research Ethics Committee with reference no: NHREC/05/01/2008B-FWA00002458-1RB00002323 and Nnamdi Azikiwe University Teaching Hospital Health Research Ethics Committee with reference no: NAUTH/CS/66/VOL.16/VER.3/73/2024/012. Written informed consent was obtained from the participants before enrolment into the study, and they were guaranteed anonymity and confidentiality.

RESULTS
A total of 485 respondents participated (96% response rate) in the study. Most participants were aged ≥ 55 years (53.2 %) and female (60.2 %). The demographic characteristics are shown in Table 1.

Table 1: Demographic characteristics of hypertensive patients (n=485)

Characteristics		Frequency	Percent
Age range (Years)	18-25	7	1.4
	26-35	53	10.9
	36-45	73	15.1
	46-55	94	19.4
	= 56	258	53.2
Gender	Male	193	39.8
	Female	292	60.2
Marital status	Single	69	14.2
	Married	320	66.0
	Divorced	7	1.4
	Widowed	89	18.4
Occupation	Unemployed	184	37.9
	Public/Civil Servant	118	24.3
	Self-employed	183	37.7
Monthly income (in ? 1,000)	None	108	22.3
	<30	157	32.4
	30-150	177	36.5
	>150	43	8.9
Level of education	None	36	7.4
	Primary	136	28.0
	Secondary	137	28.2
	Tertiary	176	36.3

The clinical characteristics of participants are shown in Table 2. Stage 1 hypertension was observed to be the most common (41.6%), and 50.7% of the participants had comorbidities.

Table 2: Clinical characteristics of hypertension patients (n = 485)

Clinical characteristics		*f*	%
Blood pressure	Normal	92	19
	Elevated	191	39.4
	Stage 1	202	41.6
Body mass index	Underweight	21	4.3
	Normal	324	66.8
	Overweight	124	25.6
	Obese	16	3.3
Presence of co-morbidity	Yes	246	50.7
	No	239	49.3

Overall, 71.5 % of the participants demonstrated good awareness of non-pharmacological management (Table 3). The most recognized measures were fruit/vegetable intake and stress avoidance.

Table 3: Awareness of non-pharmacological management of hypertensive (*n* = 485)

Awareness about their disease and expected lifestyle adjustments				"Yes" responses *f*	"Yes" responses %
Eat whole fruits and vegetables				457	94.2
Avoid stress				447	92.2
Stopping cigarette smoking				428	88.2
Avoid extra salt intake				416	85.8
Do regular exercise				401	82.7
Do BP check weekly				392	80.8
Limit alcohol intake				375	77.3
Hypertension is a preventable disease				344	70.9
Avoid using excess cooking oil in their meals				97	20.0
Overall level of awareness	Good	347	71.5 %		
	Poor	138	28.5 %		

NB: Scores = 7 out of a total of 9 indicate good awareness

Overall compliance with non-pharmacological management was 62.7 % (Table 4). Physical exercise components showed the lowest adherence rates.

Table 4: Compliance with non-pharmacological management of hypertension (n = 485)

Variables			"Yes" Responses	
			f	%
Limited alcoholic beverages			432	89.1
Diminished consumption of sugar and sweets			419	86.4
Increased consumption of fresh vegetables			409	84.3
Reduced consumption of coffee			403	83.1
Increased consumption of fresh fruits			402	82.9
Have some ways to relieve stress or tension			392	80.8
Set aside daily time for relaxation for self			391	80.6
Increased consumption of grains			371	76.5
Complied with a low-salt diet			367	75.7
Able to control the amount of food you consume			363	74.8
Increased consumption of fibre			333	68.7
Maintained body weight under control			331	68.2
Control yourself emotionally in sudden events			327	67.4
Increased consumption of low-fat dairy products			324	66.8
Dedicates at least 30 minutes to physical exercise			288	59.4
Performs physical exercise at least five times per week			283	58.4
Overall compliance	Compliant	304	63.1 %	
	Non-compliant	181	37.3 %	

NB: Scores = 12 out of a total of 16 indicate compliance

Among demographic variables, only occupation was significantly associated with compliance ($2 = 6.915$, $p = 0.032$) (Table 5).

Table 5: Association between demographic characteristics and compliance with non-pharmacological management among hypertension patients (n = 485)

Demographics		Compliant	Noncompliant	χ^2	*p-value*
Age range (Years)	18-25	5 (71.4)	2 (28.6)	6.054	0.191*
	26-35	27 (50.9)	26 (49.1)		
	36-45	48 (65.8)	25 (34.2)		
	46-55	66 (70.2)	28 (29.8)		
	= 56	158 (61.2)	100 (38.8)		
Gender of respondents	Male	119 (61.7)	74 (38.3)	0.143	0.705
	Female	185 (63.4)	107 (36.6)		
Marital status	Single	46 (66.7)	23 (33.3)	3.939	0.267*
	Married	202 (63.1)	118 (36.9)		
	Divorced	2 (28.6)	5 (71.4)		
	Widowed	54 (60.7)	35 (39.3)		
Occupation	Unemployed	117 (63.6)	67 (36.4)	6.915	0.032
	Public/Civil Servant	84 (71.2)	34 (28.8)		
	Self-employed	103 (56.3)	80 (43.7)		
Monthly income (in ? 1,000)	Not applicable	65 (60.2)	43 (39.8)	0.601	0.896
	<30	101 (64.3)	56 (35.7)		
	30-150	110 (62.1)	67 (37.9)		
	>150	28 (65.1)	15 (34.9)		
Level of education	None	21 (58.3)	15 (41.7)	3.690	0.297
	Primary	80 (58.8)	56 (41.2)		
	Secondary	83 (60.6)	54 (39.4)		
	Tertiary	120 (68.2)	56 (31.8)		

= Fisher's Exact Test (FET); p < 0.05= significant

In multivariable logistic regression analysis, self-employment independently predicted compliance (AOR = 2.23, 95 % CI: 1.25-3.95, p = 0.006) (Table 6). Smoking was reported by 3.7 % of the respondents, all of whom had ceased smoking at the time of the study.

Table 6: Demographic predictors of compliance to non-pharmacological management (n = 485)

Variables	95 % CI			
	AOR	Lower	Upper	Sig.
Age (Years)				0.130
Age (26-35)	1.294	0.230	7.299	0.770
Age (36-45)	0.541	0.278	1.052	0.070
Age (46-55)	1.208	0.655	2.230	0.545
Age (=56)	1.395	0.802	2.427	0.238
Gender of respondents (female)	0.886	0.600	1.308	0.543
Marital status				0.424
Marital status(married)	1.030	0.477	2.221	0.941
Marital status (divorced)	1.036	0.595	1.802	0.901
Marital status (widowed)	0.243	0.043	1.375	0.110
Occupation				0.029
Occupation (public/civil servant)	1.591	0.906	2.794	0.106
Occupation(self-employed)	2.225	1.253	3.950	0.006
Monthly income				0.475
Monthly income (< ₦3,000)	1.243	0.498	3.103	0.641
Monthly income (₦30,00 - ₦150,000)	1.655	0.684	4.003	0.264
Monthly income (> ₦150,000)	1.593	0.734	3.459	0.239
Level of education				0.910
Level of education(primary)	0.632	0.036	11.059	0.754
Level of education(secondary)	0.834	0.368	1.889	0.663
Level of education(tertiary)	0.824	0.484	1.402	0.476
Constant	0.824	0.484	1.402	0.763

Reference categories: first category for all categorical variables; p < 0.05= significant; CI = confidence interval; AOR = adjusted odds ratio

The observed compliance proportion (62.7 %) was significantly higher than the hypothesised 60 % benchmark (one-sample binomial test, exact p < 0.001) (Table 7).

Table 7: One-Sample Binomial Test of compliance with Non-pharmacological management of hypertension. (n = 485)

Compliance Category	*F*	%	Test proportion	Exact p-value (1-tailed)
Non-compliant	181	37.3	0.6	< 0.001
Compliant	304	62.7	-	-
Total	485	1	-	-

NB: Compliance was coded as 1 = compliant and 0 = non-compliant; ***p < 0.05 = significant***

DISCUSSION

This study assessed awareness, compliance, and demographic predictors of non-pharmacological management among adult hypertensive patients in Southeastern Nigeria. The findings showed a high level of awareness (71.5 %) and a moderate-to-high compliance rate (62.7 %), with occupation emerging as the only independent predictor of compliance.

The high level of awareness observed in this study suggests increased public health education in the region.[13-15] Although awareness of certain components, particularly structured physical exercise, was comparatively lower, it aligns with findings from other African studies, in which awareness of diet-related modifications was generally higher than that of exercise-related interventions.[49] In contrast, studies conducted in Ghana and elsewhere reported markedly low awareness of non-pharmacological management, suggesting possible contextual differences in health education exposure and public health messaging.[26,50]

Despite the relatively high awareness, compliance was 62.7 %, highlighting the persistent gap between knowledge and practice. This finding reinforces earlier reports that awareness does not necessarily translate into sustained behavioural change. Compared with previous studies, which reported poor practice among the majority of respondents, the compliance level observed in this study appears relatively favourable.[26,50] Nevertheless, adherence to physical exercise recommendations remained the weakest component of compliance. Similar patterns have been documented in other Nigerian and international studies, in which structured physical activity consistently showed the lowest adherence rates.[46,52-53] The relatively low exercise compliance in this study may partly be explained by the age distribution of the participants: over half were aged 56 years or above, and the majority had comorbidities that may limit physical activity.[54]

The study also demonstrated that occupation was significantly associated with compliance, and self-employment independently predicted compliance in multivariable analysis. Higher education was reported as a correlate of better adherence to dietary management, while being married, age, and gender were associated with adherence to dietary management and physical activity.[26,55,56] Public and civil servants showed higher compliance levels compared to self-employed individuals. This may reflect differences in socioeconomic stability, structured work environments, access to health information, and possibly better exposure to workplace health promotion programmes. The economic and time-related pressures commonly faced by self-employed individuals may reduce adherence to lifestyle modification practices. Similar associations between socioeconomic factors and self-management of hypertension have been reported in previous studies.[57] Other demographic variables, such as age, gender, income, and educational level, were not significant predictors, suggesting that compliance may be influenced more by occupational and contextual factors than by basic sociodemographic characteristics alone.

From a public health perspective, the findings suggest that while awareness campaigns in Southeastern Nigeria may be yielding results, targeted strategies are required to translate knowledge into consistent practice, particularly regarding physical activity. Pharmacists and primary healthcare providers should intensify counselling efforts and develop practical, culturally

appropriate exercise promotion strategies tailored to older adults.

This study has some limitations. The cross-sectional design limits causal inference, and self-reported compliance may introduce social desirability bias. Additionally, the study was conducted within a specific geographic region, which may limit generalisability to other parts of Nigeria. Nonetheless, the relatively large sample size and the use of multivariable analysis strengthen the validity of the findings.

CONCLUSION

This study demonstrates relatively high awareness and moderate compliance with non-pharmacological management among hypertensive patients in Southeastern Nigeria, with occupation emerging as a significant predictor. The findings highlight a persistent knowledge-practice gap, particularly regarding structured physical exercise. In clinical practice, these results underscore the need for structured lifestyle counselling protocols within hypertension clinics. Pharmacists and other healthcare providers should integrate targeted behavioural reinforcement and individualized lifestyle modification plans into routine care, especially for economically active and self-employed patients who may face occupational constraints. Strengthening pharmacist-led patient education and multidisciplinary collaboration may enhance long-term adherence to non-pharmacological strategies and ultimately improve blood pressure control outcomes.

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