

Assessment of Home Blood Pressure Monitoring and Medication Adherence Among Hypertensive Patients in a Nigerian Hospital: A Cross-Sectional Study

Muritala Adewale Ibrahim¹, Ibrahim Sebutu Bello², Adekunle Fakunle³, Akindele Amos Ajayi¹, Omowonuola Olubukola Sonibare¹, Olatunji Taofik Bankole³, Temilade Basirat Bello³, Iyanu Adufe³

1. Department of Family Medicine, College of Health Sciences, Osun State University, Osogbo, Osun State, Nigeria.
2. Department of Family Medicine, OAUTHC, Ile-Ife, Osun State, Nigeria.
3. Department of Public Health, College of Health Sciences, Osun State University, Osogbo, Osun State, Nigeria.

Corresponding author

Muritala Adewale Ibrahim

Department of Family Medicine, College of Health Sciences, Osun State University Osogbo, Osun State, Nigeria.

Email: muritala.ibrahim@uniosun.edu.ng

ABSTRACT

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Background: Home blood pressure monitoring (HBPM) is increasingly recognised as an affordable method that could enhance medication adherence among individuals with hypertension. This study examined the relationship between HBPM and medication adherence among hypertensive patients attending the Family Medicine clinic at the Osun State University Teaching Hospital, Osogbo, a tertiary care centre in Western Nigeria.

Method: A cross-sectional design was used among 300 known hypertensive patients attending the Family Medicine clinic of Osun State Teaching Hospital, a tertiary care facility, from August to November 2021. HBPM was determined through evidence of blood pressure monitoring practices at home using a digital blood pressure machine, while medication adherence was assessed with the Morisky 8-item medication adherence questionnaire. Data were analysed using descriptive and inferential statistics at a p-value < 0.05.

Result: The mean age ($\pm$ SD) of the respondents was 54.47 ($\pm$ 12.18) years. The level of practice of HBPM was 23.3%. A higher percentage of respondents (39.8%) who practiced HBPM reported that it reminded them to take their medication, while 15.0% of them reported skipping their medication when blood pressure was low. A greater proportion of respondents who were not adherent practiced HBPM, whereas a higher proportion of adherent respondents did not practice HBPM. This study found no statistically significant relationship between HBPM and medication adherence ($p=0.178$).

Conclusion: The practice of HBPM was poor among the study population. This study indicates that HBPM may enhance medication adherence by reminding patients to take their medication; however, it might also lead to patients skipping prescribed doses. Clinicians in our setting should research more on HBPM among hypertensive patients alongside other strategies known to improve medication adherence.

Keyword: Hypertension, home blood pressure monitoring, medication adherence, hypertensive patients

INTRODUCTION

Hypertension is the leading preventable risk factor for cardiovascular disease burden globally.¹ However, many hypertensives remained undiagnosed, while some of those diagnosed are not on treatment with majority of those on treatment not achieving target blood pressure (BP) control.² The practice of home blood pressure monitoring (HBPM) has been increasing and is recommended for diagnosis, treatment, adjustment, and long-term follow-up of hypertension cases.² However, the practice of HBPM remains low in our setting, possibly due to its lack of inclusion in national hypertension treatment guidelines and the cost of digital blood pressure monitors. A similar low practice rate (19.6 %) of Self-monitoring of Blood Pressure was also reported in another African study.³

Also Akintunde AA, and Akintunde TS reported poor medication adherence among hypertensives in Nigeria.⁴ Studies have also shown that there is a positive association between the practice of HBPM and long-term adherence to

antihypertensive drug treatment among hypertensive patients.⁵ The mostly asymptomatic nature of hypertension and the need for indefinite medication use are major challenges to medication adherence among hypertensive patients.

The relationship between home blood pressure monitoring (HBPM) and lowered blood pressure in hypertensive patients practicing HBPM is not well understood however, possible pharmacological explanations may include better adherence to medication or pharmacological mediators such as diet, alcohol, exercise and weight loss.⁶ Understanding which mediating factors are responsible could allow room for treatment modalities for future interventions.⁷

METHODS

Study design and setting

Hospital-based cross-sectional study was conducted from August 16 to November 16, 2021. The study was carried out

at the Family Medicine Clinic (general out-patient clinic) of a tertiary care facility in Western Nigeria. The hospital is situated in the southwestern Nigeria and provides primary, secondary and tertiary levels of care for people of all age groups in its locality, which include Osogbo, the surrounding towns and villages of the state, and the surrounding states of which include Ekiti, Oyo, Kwara, Ogun and Ondo states.

Sample size and sampling technique

The minimum sample size for the study was estimated using the single population proportion formula at 95% confidence interval with 5% desirable error assumptions and 75.1% medication adherence rate among hypertensive patients attending the Debre Tabor General Hospital, northwest Ethiopia was utilized.⁸ The sample size was rounded up to 300.

Systematic random sampling technique was used to recruit subjects for this study within a period of three months. Sampling interval of 3 was arrived at by dividing the sapling frame (900) by the calculated sample size (300). Every third patient was interviewed with the use of interviewer-administered semi-structured questionnaire on every clinic day until the total calculated sample size of 300 was obtained.

Inclusion and exclusion criteria

Inclusion criteria; All consenting adult hypertensive patients aged 18 years and above who had been receiving medication for hypertension in the clinic for at least six months.

Exclusion criteria: Patients with an inability to communicate due to mental or physical illness, acutely ill patients and those who were not willing to participate in the study.

Variables

The dependent variable was medication adherence while the independent variable was home blood pressure monitoring.

Data collection tool

A pre-tested interviewer-administered semi-structured questionnaire was used to collect data from the respondents on socio-demographic data and practice of home blood pressure monitoring. Morisky 8-Item Medication Adherence Questionnaire was used to assess for adherence to antihypertensive medication. Each question on the Scale has a yes or no answer. Each item was scored 1 for yes answer and 0 for no answer. The total score on the Scale was 8 while, the lowest score was 0. Scores greater than 2 were regarded as low adherence, scores of 1 or 2 were regarded as medium adherence, while score of 0 was regarded as high adherence.

Operational definition

The practice of home blood pressure monitoring among participants was regarded as those who owned a digital

blood pressure machine and were using it to monitor their blood pressure at home, with evidence of such records.

Data analysis

All data was checked, cleaned and fed into a personal computer and analyzed using the Statistical Package for Social Sciences now known as Statistical Product and Service Solutions (SPSS) version 25.0 (IBM) for windows software version. Univariate analysis was achieved using frequency tables and Charts, for bivariate analysis, chi square was used to evaluate strength of association between each categorical variable. Multivariable analysis was performed using regression analysis and P value of < 0.05 was taken as statistically significant.

Results

A total of 300 known hypertensives completed the study and were included in the analysis.

Table 1 shows the Socio-demographic characteristics of respondents. Over 90% were aged more than 40 years and above, 62.7% were females, 85.3% were Yoruba, 64.3% had tertiary education, 81.3% were married with 79.3% in monogamous relationships, 52.7% were civil servants, 68.3% were Christians, while 91.7% were earning more than the minimum wage.

Table 1: Socio-demographic characteristics of respondents

Variables	Frequency (N)	Percentage (%)
Age Group		
21-30yrs	7	2.4
31-40yrs	16	5.3
41-50yrs	100	33.3
51-60yrs	99	33.0
>60yrs	78	26.0
Gender		
Male	112	37.3
Female	188	62.7
Tribe		
Yoruba	256	85.3
Others	44	14.7
Educational Status		
Secondary and less	107	35.7
Tertiary	193	64.3
Marital Status		
Single	26	8.7
Married	244	81.3
Divorced	6	2.0
Separate	5	1.7
Widowed	19	6.3
Marriage pattern		
Monogamous	238	79.3
Polygamous	62	20.7
Occupation		
Civil servant	158	52.7
Artisan	17	5.7
Trader	76	25.3
Unemployed	49	16.3
Income		
≤30,000	25	8.3
>30,000	275	91.7

Figure 1 illustrates the level of practice of HBPM among respondents. The figure shows that 23.3% of the hypertensive patients practiced HBPM.

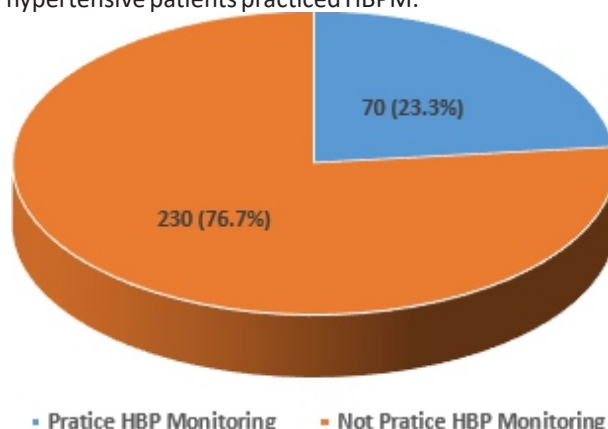


Figure 1: Pie chart showing the level of practice of home blood pressure monitoring among respondents, N=300

Table 2 shows the association between sociodemographic variables and medication adherence. Being young, female, lesser educated, and higher income were associated with adequate adherence however these statistical associations were not significant.

Table 2: Association between sociodemographic variables and medication adherence

Variables	Medication adherence		Test statistic
	Inadequate (%)	Adequate (%)	
Age group (years)			
≤50	74 (60.2)	49 (39.8)	0.559; 0.455
>50	114 (64.4)	63 (35.6)	
Gender			
Male	75 (67)	37 (33)	1.411; 0.235
Female	113 (60.1)	75 (39.9)	
Level of education			
Secondary and less	67 (62.6)	40 (37.4)	0.001; 0.989
Tertiary	121 (62.7)	72 (37.3)	
Income (Naira)			
≤30,000	18 (72)	7 (28)	1.015; 0.314
>30,000	170 (61.8)	105 (38.2)	

Table 3 shows the association between home blood pressure monitoring and medication adherence. Higher proportion of respondents that were not adherent practiced HBPM, however this association was not statistically significant ($p=0.178$).

Table 3: Association between home blood pressure monitoring and medication adherence

Variable	Adherent	Not Adherent	Total n (%)	df	X ² value	p-value
Home BP Monitoring						
Yes	31(44.3)	39(55.7)	70(100)	1	1.815	0.178
No	123(53.5)	107(46.5)	230(100)			

Table 4 shows the practice of HBPM. The figure shows that higher proportion of the respondents (39.8%) that practiced HBPM reported that the practice of HBPM reminded them to take their medication while 15.0% of them reported to have skipped their medication when blood pressure was low.

Table 4: Practice of HBPM

Variables	Frequency (n)	Percentage (%)
In what ways has home BP monitoring be of help in your hypertension management?		
Remind me to take my medication	45	39.8
Help me to skip medication if value is low	17	15.0
Help me to increase my medication if high	15	13.3
Remind me the need to see doctor	36	31.9
Do you own a BP machine? (N=300)		
Yes	113	37.7
No	187	62.3
If yes who prescribed it for you (n=113)		
Doctor	62	54.9
Nurse	10	8.8
A friend	18	15.9
Co-patient	23	20.4
If no, why (n=187)		
I cannot afford it	163	87.2
Not readily available	18	9.6
Others	6	3.2
How often do you used to check your BP at home? (n=103)		
Anytime I am not feeling fine	73	64.6
Twice daily morning and evening	17	15.0
Twice daily at anytime	14	12.4
As many times as possible	9	8.0
Do you rest for about 5 minutes before measuring your BP? (n=103)		
Yes	89	78.8
No	24	21.2
Do you usually record it? (n=103)		
Yes	70	61.9
No	43	38.1
Where do you used to record it? (n=70)		
Exercise book	69	98.6
Phone	1	1.4
Practice of HBPM		
Those who recorded their BP at Home	70	23.3
Those who own BP machine but not recorded	43	14.3
Those who had no own BP machine	187	62.4
Controlled Home BP monitoring(n=70)		
Control BP (1<135/85)	50	71.4
Not Controlled	20	28.6
Controlled Clinic BP monitoring(N=300)		
Control BP (<140/90)	140	46.7
Not Controlled	160	53.3

Discussion

The level of practice of home blood pressure monitoring recorded in this study was 23.3% which is similar to a practice level of 19.6 % recorded in another African study.³ Low practice rates, 7.75% and 25.3%, of HBPM were recorded in Ethiopia and Chana respectively which are developing countries^{7,9} while higher rates of practice of HBPM were recorded in developed countries such as Hong Kong and USA with HBPM practice rates of 67.8% and 62.9% respectively.^{10,11}

The observed differences in the low level of practice of HBPM in developing countries and the higher level in developed countries may probably be due to the high cost and scarcity of digital blood pressure monitors in developing nations compared to developed ones. Knowledge and awareness about the use of home blood pressure monitoring among the public and hypertensive patients may also influence its utilisation. Additionally, most developing countries have yet to incorporate the practice of HBPM into their national hypertension treatment guidelines.

This study also found an association between some sociodemographic variables and medication adherence, with adequate adherence observed among the young respondents, females, those with lower education, and

those with income above the minimum wage. However, these statistical associations were not significant.

This study found no statistically significant link between home blood pressure monitoring and medication adherence among participants. This is similar to what was reported in a randomized controlled trial involving hypertensive patients in Korea, where an improvement in medication adherence was observed with home blood pressure monitoring but, however, did not establish any statistically significant link between home blood pressure monitoring and medication adherence.¹² Additionally, a prospective observational study conducted in 150 general hospitals and 204 local clinics in South Korea recorded a connection between self-monitoring of blood pressure and medication adherence.¹³ The study demonstrated an improvement in medication adherence with increased self-monitoring rates of blood pressure among the studied hypertensive patients.¹³

The former study is a randomised controlled trial, while the latter is a prospective observational study. There were 88 participants in the former study, whereas the later study involved 7751 hypertensive patients. The fact that the former study is a randomised controlled trial makes its findings more valid for establishing cause-and-effect relationships. However, the fact that both studies recorded an improvement in medication adherence following self-monitoring of blood pressure could suggest that other factors, apart from self-monitoring of blood pressure alone, could also influence medication adherence. For example, factors such as patients' knowledge of hypertension and its complications were some of the main factors identified to influence patients' adherence to treatment,¹⁴ which were not examined in the previous studies. Similarly, Fletcher BR, in a randomised controlled trial, finds no statistically significant association between home blood pressure monitoring and medication adherence.¹⁵ However, Fletcher BR concluded that self-monitoring of blood pressure may contribute to improvements in medication adherence in hypertensive patients, though evidence for the effect of self-monitoring of blood pressure on lifestyle change and medication persistence is scarce, of poor quality, and suggests little clinically relevant benefit.¹⁵ Moreover, the level of practice of home blood pressure monitoring (23.3%) recorded in this study was low, and it was observed that HBPM reminded some respondents of the need to take their medications, while it encouraged skipping of the recommended dose in others.

Declarations

Ethics Approval

Approval for the study protocol was obtained from the Research and Ethical committee of LAUTECH teaching hospital, Osogbo (protocol number; LTH/EC/2021/03/508). Permission was granted by the Head of Department of Family Medicine before commencement of the study. The participants were also assured of confidentiality.

CONFLICTS OF INTERESTS

"The authors declare that they have no conflicts of interests"

FUNDING

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IMPLICATIONS FOR POLICIES/PRACTICE

More research is needed on Home blood pressure monitoring among hypertensive patients. Enabling telemedicine in health sector will further increase the effectiveness of home blood pressure monitoring as patients can easily communicate from their home with their clinicians who can adjust their medication rather than skipping it as it was discovered in this study. Other strategies that could increase medication adherence should also be employed. Further studies on home blood pressure monitoring and medication adherence is also suggested.

LIMITATIONS

The cross-sectional design nature of this study will prevent inferences to be drawn as regards causal-effect relationship of variables. Also, the Morisky 8-point medication adherence scale (8-MMAS) employed in this study is a self-reporting method for determining medication adherence and self-reported data is subject to biases such as response and recall biases.

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CONTRIBUTIONS OF EACH AUTHOR

IBRAHIM Muritala Adewale made substantial contribution to conception and design of the study while all authors were involved in data collection, data analysis, presentation and discussion of findings. All authors were involved in writing and approved the final manuscript.

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