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ORIGINAL RESEARCH

Pattern and Factors Associated with Medication Adherence to Antihypertensive Medications Among Stroke Survivors

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Abstract

Background: Hypertension is a major risk factor for initial and recurring strokes.
Objective: To determine medication adherence and blood pressure control among stroke survivors.
Methods: This one-year cross-sectional study recruited 95 consenting neuroimage-confirmed stroke patients attending the neurology clinic with confirmed hypertension. Stroke severity, functional outcome, and medication adherence were evaluated using the National Institute of Health Stroke Score (NIHSS), the Modified Rankin Scale (MRS), and the Morinsky Medication Adherence Scale (MMAS-8), respectively.
Results: There was a preponderance of male participants [49 (89.1) vs 6 (10.1); p = 0.887], older participants [61.01±11.58 years vs 51.20±8.28 years; p = 0.010] and diabetes mellitus patients [26 (30.6%) vs 0 (0.0%) p = 0.040] among ischaemic cohort compared to the haemorrhagic cohort. Based on the grade of medication adherence, there was a higher mean Diastolic Blood Pressure (DBP) [81.99±10.89 mmHg vs 91.91±17.25 mmHg vs 84.0±18.166 p = 0.043], and Systolic Blood Pressure (SBP) [129.41±16.74 vs 143.55±25.97 vs 145.60±40.08; p = 0.025] among participants with low adherence. Factors associated with medication adherence in stroke survivors were SBP at one year (p = 0.025), DBP at one year (p = 0.043), and the number of antihypertensive medications taken (p = 0.010). SBP at one year was the only independent predictor of medication adherence.
Conclusion: High medication adherence was associated with improved BP control among stroke survivors. As such, policy and clinical focus should be geared towards ensuring medication adherence in stroke survivors.

Keywords: Blood pressure, *Hypertension, Medication adherence, Stroke.*

Introduction

Stroke is a significant cause of death and disability worldwide, affecting one in six adults annually. [1–3] Hypertension is a major risk factor for both initial and recurring strokes. [4,5] Blood Pressure (BP) variability, elevated Systolic BP (SBP), uncontrolled Diastolic BP (DBP), and concurrent SBP and DBP rise are linked to stroke occurrence with worse

severity. [2,6–8] Effective BP management aims for a reduction of 10 mmHg in SBP and 5 mmHg in DBP among hypertensive, non-hypertensive, Diabetes mellitus (DM), and Chronic Kidney Disease (CKD) patients. [2,6] Globally, about one billion adults have hypertension, with its prevalence still increasing. Achieving the target BP control is vital to reducing cardiovascular mortality and morbidity. Hypertension significantly raises the risk of recurrent stroke. [9,10]

The factors contributing to hypertension-induced stroke include oxidative stress, inflammation, and arterial dysfunction. [9,11] Hypertensive remodelling of blood vessels causes narrowing and thickening of resistance vessels, leading to conditions like lipohyalinosis, Charcot-Bouchard microaneurysms, and leukoaraiosis. [9,11] Accurately confirming resistance to BP control is crucial for diagnosing Resistant Hypertension (RH), proposed as an extreme treatment failure to three antihypertensive therapies. [12,13] Unfortunately, there's a growing incidence of hypertension and RH among stroke survivors, leading to recurrent strokes. [14,15] Non-adherence to medication significantly contributes to the rise in uncontrolled hypertension, especially among Africans with high BP, and can be a major cause of recurrent stroke. [14,16,17] Ineffective BP management can lead to serious health risks like heart disease, stroke, and kidney disease, underscoring the need to understand factors influencing medication adherence. [18,19] Furthermore, there is limited research focused on uncontrolled BP and patterns of antihypertensive usage among stroke survivors. This study aimed to determine patterns and factors associated with adherence to antihypertensive among stroke survivors.

Methods

Study design, study setting and study population

The study was carried out at the Olabisi Onabanjo University Teaching Hospital, Sagamu, southwest Nigeria, a major referral centre in southwest Nigeria, which also receives neurological cases from south-south and other parts of Nigeria. A total purposive sampling method was used to determine the minimum sample size, and participants attending the neurologic/stroke clinic were recruited consecutively.

This cross-sectional study, which was descriptive and observational, was conducted using World Health Organization (WHO) criteria [20,21] with further neuroimaging confirmation among 95 consecutive stroke patients attending the neurology clinic. The patients were recruited into the study after 1-year post-stroke diagnosis. The study excluded patients with stroke mimics and those with symptoms and signs of stroke with no cranial Computerised Tomographic scan (CT scan) done. Age, gender, and clinical information, including past medical history, were obtained from each participant, and a physical examination with a detailed neurological assessment was performed and recorded in case record forms prepared for the purpose. Each patient's medical care was in line with the standard of care for stroke patients, including the use of medications, for example, treatment of hypertension, appropriate nursing care, and physiotherapy.

Neuroimaging protocol

Neuroimaging scans (CT and/or Magnetic Resonance Imaging (MRI)) were obtained for recruited participants. An initial assessment was conducted immediately after acquiring images without contrast. While no contrast agent was administered to the haemorrhagic stroke group, the ischaemic stroke group received 40mls of iodine-based Ultravist intravenously at a rapid rate before obtaining post-contrast images. The ABC/2 method was used to estimate the volume of both haemorrhagic and ischaemic strokes. [22,23]

Assessment of Blood Pressure

The systolic and diastolic blood pressures were measured at three separate times a day, exactly a year after the onset of stroke symptoms. Participants rested for approximately one hour upon arrival at the clinic. Trained medical professionals conducted the BP assessments, and the mean of the last two measurements was calculated and recorded as the BP for each participant.

Stroke severity and outcome

Stroke severity upon admission was evaluated using the National Institute of Health Stroke Scale (NIHSS), which was repeated 72 hours, 7 days, 14 days, and 30 days post-stroke. NIHSS scores range from 0 (indicating no stroke) to 42 (representing the most severe stroke). Functional outcomes were assessed using the Modified Rankin Scale (MRS) at admission, 14 days, and 30 days post-stroke.

Assessment of medication adherence

The Morinsky Medication Adherence Scale (MMAS-8) was utilised to evaluate the medication adherence of individuals with stroke. This is an 8-item structured questionnaire that has been previously validated, demonstrating high reliability and validity. [24,25] It has been widely employed to assess medication adherence in various patient populations, including those with diabetes, hypertension, and psychiatric conditions. [26,27] The questionnaire collects information on how frequently patients forget to take their medications and their reasons, utilising binary (Yes/No) and five-option response formats (never/rarely/sometimes/often/always). The scoring interpretation of the MMAS-8 is as follows: a score of 0 indicates high adherence, scores of 1-2 suggest moderate adherence, and scores greater than 2 indicate poor adherence. The questionnaire includes inquiries such as whether the patient ever forgets to take their prescription, occasionally misses the medication at the scheduled time, stops taking it when feeling better, or discontinues it due to adverse effects. Patients who answered "no" to all questions were classified as highly adherent, while those who responded affirmatively to one or more questions were considered to have moderate adherence. [26]

Definition of terms

Hypertension was defined as a mean SBP of 140 mmHg and DBP of 90 mmHg, a prior diagnosis of hypertension by a healthcare provider, or the use of antihypertensive medications, according to the guidelines of the American Heart Association Diabetes. [28, 29] Diabetes mellitus (DM) was defined as either a self-reported prior diagnosis by a medical professional, a glycated haemoglobin (HbA1c) level greater than 6.5%, a fasting blood glucose level of 126 mg/dl or higher, or the use of glucose-lowering medications. [30, 31]

NIHSS was classified as follows: scores 1-4 as mild stroke, scores 5-15 as moderate stroke, 16-20 score as moderate to severe stroke, and scores ranging from 21-42 were classified as severe stroke. [32, 33] Functional outcomes were conducted by the examiner using MRS questionnaires. Participants with MRS scores of 0, 1, 2, or 3 were categorised as having a favourable outcome, while those with scores of 4, 5, or 6 were considered poor. [34, 35] Medication adherence scoring interpretation by the MMAS-8 is as follows: a score of 0 indicates high adherence, scores of 1-2 suggest moderate adherence, and scores greater than 2 indicate poor adherence.

Ethical considerations

Ethical clearance was obtained from the Health Research Ethics Committee (HREC) of OOUTH with HREC approval certificate number OOUTH/HREC/690/2023AP.

The study participants were fully informed of the research protocol detailing the research's purpose, method, risks, and benefits. Each of the participants voluntarily gave written informed consent.

Data analysis

Data were coded and analysed using the IBM Statistical Package of Social Sciences Version 23. The categorical and continuous data were presented using percentages and mean standard deviation (SD), respectively.

Demographics which include sex, age, stroke severity, MRS, number of antihypertensives, DBP at one year, SBP at one year, and stroke type, were all compared with the level of adherence to determine factors associated with adherence using the Chi-Square test or independent sample t-test for categorical variables or continuous variable, respectively Multiple logistic regression was used to estimate the adjusted odds ratio (an OR) and 95% confidence interval (95%CI). The level of statistical significance was set at a p-value of <0.05. Variables that were associated were constructed into a regression model using the cumulative odds ordinal logistic regression with proportional odds, specifically, the PLUM procedure was used. Before the regression model, a test of assumption was also performed to determine multicollinearity. Variance inflation factor (VIF) values for all variables with multicollinearity were <5, as such, there was no multicollinearity.

Results

Clinical characteristics among stroke patients

This study found preponderance of male participants [49 (89.1) vs 6 (10.9) p = 0.887], older participants [61.01±11.59 years vs 51.20±8.28 years; p = 0.010] and diabetes mellitus cases [26 (30.6%) vs 0 (0.0%); p = 0.040] among ischaemic cohort compared to haemorrhagic cohort. There was no significant difference in clinical characteristics among male and female patients (Table I).

Location and arterial territory of stroke patients based on stroke type and gender.

Haemorrhagic stroke was more frequent in the lentiform nucleus [5 (6.0%) vs 4 (40.0%)] compared to ischaemic stroke. There was no significant difference in clinical characteristics among male and female patients (Table II). The percentage of participants with the anterior cerebral artery (ACA), middle cerebral artery (MCA), and posterior cerebral artery (PCA) was 13 (15.8%), 69 (72.6%), and 14 (14.7%), respectively. Among participants with ACA, 13 (15.3%) had an ischaemic stroke compared to 2 (20.0%) who had a haemorrhagic stroke. Furthermore, among participants with MCA, 61 (71.8%) had ischaemic stroke compared to 8 (80.0%) with haemorrhagic stroke. Similarly, 14 (16.5%) had an ischaemic stroke without having a haemorrhagic stroke (See Figure 1).

Pattern of adherence in antihypertensive among stroke survivor

The medication adherence was high in 79 (83.1%), medium in 11 (11.6%) and low in 5 (5.3%) respectively (See Figure 2).

Comparison of stroke characteristics and adherence among stroke patients

The adherence pattern was comparable with regards to clinical and socio-demographic characteristics except for higher mean DBP [81.99±10.90 mmHg vs 91.91±17.25 mmHg vs 84.0±18.17 mmHg; p = 0.043] and SBP [129.41±16.74 mmHg vs 143.55±25.97 mmHg vs 145.60±40.09 mmHg; p = 0.025] among participant with low, medium and high adherence (See Table III).

Predictors of medication adherence in stroke patients.

The factors associated with medication adherence in stroke survivors were SBP at one year (p = 0.025), DBP at one year (p = 0.043), and the number of antihypertensive medications taken (p = 0.010). However, SBP at one year was the only independent predictor of stroke (p = 0.044) as shown in Table V.

Discussion

The study revealed high adherence to antihypertensive medications among stroke survivors. Furthermore, SBP, DBP, and the number of antihypertensives taken were factors associated with medication adherence at one year among stroke survivors, with higher medication adherence seen to be associated with improved BP control among stroke survivors.

Table Ia: Clinical characteristics of stroke patients

Characteristics	*Ischaemic (n = 85)*	*Haemorrhagic (n = 10)*	*Total*	*Statistics*	*p-value*
Gender (n%)					
Male	49 (89.1)	6(10.9)	55 (57.9)	$X^2 = 0.020$	0.887
Female	36 (90.0)	4(10.0)	40 (42.1)		
Age Mean (SD)	61.09±11.59	51.20± 8.28	61.09	F = 6.850	**0.010**
Age grouped (n%)					
<35	2 (2.4)	0 (0.0)	2 (2.1)		
36-70	28 (32.9)	8 (80.0)	36 (37.9)	$X^2 = 8.444$	**0.015**
71-95	55 (64.7)	2 (20.0)	57 (60.0)		
Systolic blood pressure at one year grouped (n%)	29 (34.1)	3 (30.0)	32 (33.7)	$X^2 = 0.068$	0.749
>140	56 (65.9)	7 (70.0)	63 (66.3)		
<140					
Diastolic blood pressure at one year grouped (n%)	34 (40.0)	3 (30.0)	37 (38.9)	$X^2 = 0.376$	0.540
>90	51 (60.0)	7 (70.0)	58 (61.1)		
<90					
NIHSS at Presentation Mean (SD)	15.75±7.4	13.30±7.07		F= 1.004	0.319
NIHSS grouped (n%)					
>16	10 (11.8)	0 (0.0)	10 (10.5)	$X^2 = 1.315$	0.252
<16	75 (88.2)	10 (100.0)	85 (89.5)		
MRS severity grouped (n%)	81 (95.3)	10 (100.0)	91 (95.8)	$X^2 = 0.491$	0.483
0-3	4 (4.7)	0 (0.0)	4 (4.2)		
4-6					
Antihypertensive (n%)	81 (95.3)	9 (90.0)	90 (97.4)	$X^2 = 0.503$	0.478
People with diabetes (n%)	26 (30.6)	0 (0.0)	26 (27.4)	$X^2 = 4.211$	**0.040**
Anti-diabetics (n%)	25 (29.4)	1 (100.0)	26 (27.4)	$X^2 = 1.696$	0.193
Statin (n%)	72 (84.7)	6 (60.0)	78 (82.1)	$X^2 = 3.717$	0.054
Raised ICP (n%)	4 (4.7)	0 (0.0)	4 (4.2)	$X^2 = 0.491$	0.483
Aspiration pneumonia (n%)	3 (3.5)	0 (0.0)	3 (3.3)	$X^2 = 0.364$	0.546
PTE (n%)	3 (3.5)	0 (0.0)	3 (3.2)	$X^2 = 0.364$	0.546

NIHSS-National Institute of Health Stroke Scale, SD- Standard Deviation, Raised ICP-Increased Intracranial Pressure, PTE-Pulmonary thromboendarterectomy

These research findings indicated elevated SBP and DBP levels in participants with poor medication adherence. This emphasises the importance of consistent use of antihypertensive medications among stroke survivors to maintain effective control. Additionally, the study highlighted another factor linked to medication adherence: the quantity of antihypertensive medications. In a previous study by Adeoye and colleagues on medication adherence patterns among individuals with uncontrolled blood pressure, it was observed that high medication adherence was scarce, with a third experiencing genuine uncontrolled blood pressure. [36] Effective BP management requires high medication adherence, surpasses moderate adherence, and necessitates sufficient knowledge. Moreover, a study by Kimmo Herttua *et al.* demonstrated an inverse

relationship between non-adherence to antihypertensive therapy and stroke risk, thus indicating that lower adherence correlates with increased risk. [37]

Table Ib: Clinical characteristics of stroke patients

Clinical characteristics	*Male*	*Female*	*Total*	*Statistics*	*p-value*
Age Mean (SD)	59.66±11.68	60.65±11.60		F= 0.168	0.628
Age grouped (n%)					
<35	2 (3.6)	0 (0.0)	2 (2.1)		
36-70	20 (36.4)	16 (40.0)	36 (37.9)	X^2 = 1.535	0.464
71-95	33 (60.0)	24 (60.0)	57 (60.0)		
Systolic blood pressure at one year grouped (n%)					
>140	18 (32.7)	14 (35.0)	32 (33.7)	X^2 = 0.012	0.913
<140	37 (67.3)	26 (65.0)	63 (66.3)		
Diastolic blood pressure at one year grouped (n%)					
>90	25 (45.5)	13 (32.5)	38 (40.0)	X^2 = 1.439	0.230
<90	30 (54.5)	27 (67.5)	57 (60.0)		
NIHSS at Presentation Mean (SD)	15.95±7.12	14.98±7.60		F=0.411	0.520
NIHSS grouped (n%)					
>16	6 (10.9)	3 (7.5)	10 (10.5)	X^2 = 0.625	0.429
<16	49 (89.1)	37 (92.5)	85 (9.5)		
MRS severity grouped (n%)					
0-3	53 (96.4)	38 (95.0)	92 (96.8)	X^2 = 0.119	0.730
4-6	2 (3.6)	2 (5.0)	3 (3.2)		
Antihypertensive (n%)	52 (94.5))	39 (97.5)	91 (95.8)	X^2 = 1.019	0.313
People with diabetes (n%)	14 (25.5)	12 (30.0)	26 (27.4)	X^2 = 0.295	0.587
Anti-diabetics (n%)	15 (27.3)	11 (27.5)	26 (27.4)	X^2 = 0.006	0.938
Statin (n%)	45 (81.8)	33 (82.5)	78 (82.1)	X^2 = 0.070	0..791
Raised ICP (n%)	3 (5.5)	1 (2.5)	4 (4.2)	X^2 = 0.477	0.490
Aspiration pneumonia (n%)	1 (1.8)	2 (5.0)	3 (3.2)	X^2 = 0.796	0.372
PTE (n%)	2 (3.6)	1 (2.5)	3 (3.2)	X^2 = 0.088	0.766

NIHSS-National Institute of Health Stroke Scale, SD- Standard Deviation, Raised ICP-Increased Intracranial Pressure, PTE-Pulmonary thromboendarterectomy

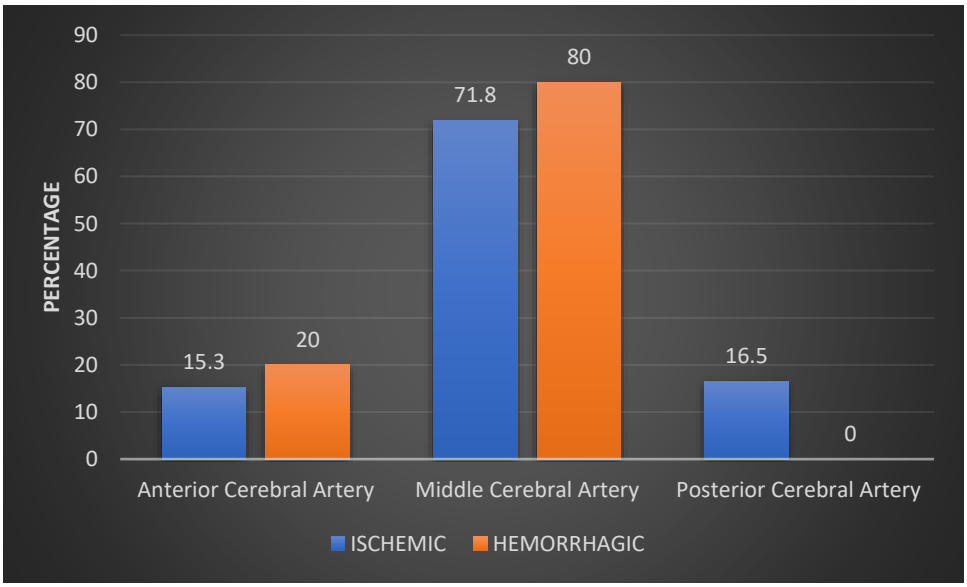

Figure 1: Pattern of stroke distribution based on arterial territory in stroke survivors

Table II: Location and arterial territory of stroke patients based on stroke type and gender

Variables	Ischaemic	Haemorrhagic	Total	X^2	p-value	Male	Female	Total	X^2	p-value
Location										
Basal ganglia	18 (21.4)	2 (20.0)	20 (21.3)	0.011	0.917	10 (18.2)	10 (25.0)	20 (21.1)	1.313	0.519
Caudate	2 (2.4)	0 (0.0)	2 (2.1)	0.234	0.622	1 (1.8)	1 (2.5)	2 (2.1)	0.781	0.677
Lentiform	5 (6.0)	4 (40.0)	9 (9.6)	11.965	**0.001**	3 (5.5)	6 (15.0)	9 (9.5)	3.109	0.211
Lobar Involvement (n%)	19 (22.6)	2 (20.0)	21 (22.3)	0.035	0.851	8 (14.5)	13 (32.5)	21 (22.1)	4.889	0.087
Frontal Lobe	30 (35.7)	2 (20.0)	32 (34.0)	0.983	0.322	15 (27.3)	17 (42.5)	32 (33.7)	2.959	0.228
Parietal Lobe	15 (17.9)	1 (10.0)	16 (17.0)	0.391	0.532	6 (10.9)	10 (25.0)	16 (16.8)	3.882	0.144
Temporal Lobe	16 (19.0)	2 (20.0)	18 (19.1)	0.005	0.942	11 (20.0)	7 (17.5)	18 (18.9)	0.858	0.651
Occipital Lobe										
Subcortical (n%)										
Internal	6 (7.1)	0 (0.0)	6 (6.4)	0.763	0.382	3 (5.5)	3 (7.5)	6 (6.3)	0.881	0.644
Capsules	11 (13.1)	2 (20.0)	13 (13.8)	0.358	0.550	7 (12.7)	6 (15.0)	13 (13.7)	0.815	0.665
Thalamus										
Infratentorial (n%)	10 (11.9)	3 (30.0)	13 (13.8)	2.455	0.117	7 (12.7)	6 (12.7)	13 (13.7)	0.815	0.665
Cerebellum	7 (8.3)	0 (0.0)	7 (7.4)	0.900	0.343	3 (5.5)	4 (10.0)	7 (7.4)	1.395	0.498
Brain stem	5 (6.0)	1 (10.0)	6 (6.4)	0.245	0.621	5 (9.1)	1 (2.5)	6 (6.3)	2.497	0.287
Pons	2 (2.4)	0 (0.0)	2 (2.1)	0.243	0.622	1 (1.8)	1 (2.5)	2 (2.1)	0.781	0.677
Midbrain										

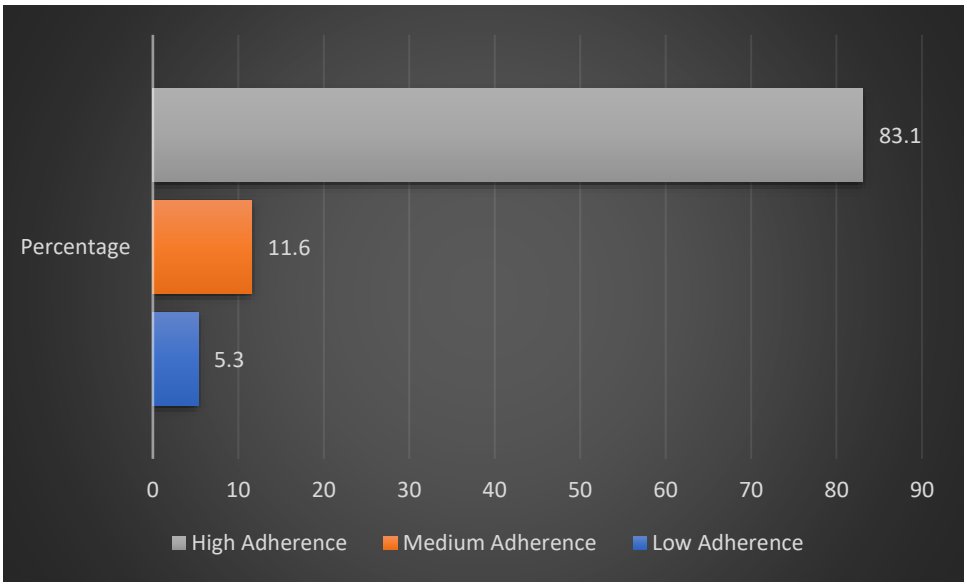

Figure 2: Pattern of adherence in antihypertensive therapy among stroke patients

Again, in a study focusing on medication adherence for secondary stroke prevention among Lebanese stroke survivors, it was found that primary barriers to adherence include medication costs and side effects. While pharmacotherapy plays a vital role in secondary stroke prevention, its effectiveness is influenced by various factors such as cognitive function, stroke severity, patient beliefs, caregiver availability, and medication affordability. [38] In contrast to the findings of this study, which indicated that a majority of participants on polytherapy exhibited high adherence to their medications, a study by Pin-Hsuan Wu found that participants using polytherapy were at a higher risk of poor BP control compared to those using a single class of antihypertensive medication. However, discrepancies in results may arise from differences in sample sizes. [39]

In other studies aimed at evaluating BP control among hypertensive stroke survivors, it was observed that the control of BP was suboptimal, with level of education and medication adherence emerging as the primary influencing factors. [40–43] Previous studies have consistently demonstrated that medication adherence is associated with a reduced risk of hospitalisation and improved outcomes in hypertensive patients.

Table III: Comparison of stroke characteristics and adherence among stroke patients

Characteristics	High Adherence (n = 79)	Medium Adherence (n = 11)	Low Adherence (n = 5)	X^2	p-value
Sex					
Male n (%)	43 (78.6)	8 (14.3)	4 (7.1)	2.269	0.322
Female n (%)	36 (90.0)	3 (7.5)	1 (2.5)		
Age					
<=35 n (%)	1 (50.0)	1 (50.0)	0 (0.0)	8.368	0.079
36-55 n (%)	34 (94.4)	2 (5.6)	0 (0.0)		
>=56 n (%)	42 (77.2)	8 (14.0)	5 (8.8)		
Stroke Severity					
>16 n (%)	8 (80.0)	0 (0.0)	2 (20.0)	5.983	0.050
<16 n (%)	71 (83.7)	11 (12.8)	3 (3.5)		
MRS					
0-3 n (%)	76(83.7)	10 (10.9)	5 (5.4)	0.920	0.631
4-6 n (%)	3(75.0)	1 (25.0)	0 (0.0)		
No of Antihypertensives					
Monotherapy n (%)	14(70.0)	6(30.0)	0(0.0)	9.136	**0.010**
Polytherapy n (%)	63(86.4)	5(6.8)	5(6.8)		
DBP at 1 year					
>90 n (%)	29(76.3)	6(15.8)	3(7.9)	2.273	0.321
<90 n (%)	50(87.9)	5(8.6)	2(3.4)		
SBP at 1 year					
>140 n (%)	23(69.7)	7(21.2)	3(9.1)	6.753	**0.034**
<140 n (%)	56(90.5)	4(6.3)	2(3.2)		
Stroke Type					
Ischaemic *n* (%)	70(82.4)	10(11.8)	5(5.9)	0.675	0.713
Haemorrhagic *n* (%)	9(90.9)	1(10.1)	0(0.0)		
	Mean±SD	Mean±SD	Mean±SD	F value	
Stroke Size	8.17±31.74	5.46±4.23	6.50±5.20	0.045	0.956
Stroke Volume	9.56±10.02	15.27±13.22	15.30±16.23	1.790	0.173
DBP at 1 year	82.00±10.90	91.91±17.25	84.0±18.17	3.246	**0.043**
SBP at 1 year	129.41±16.74	143.55±25.97	145.60±40.09	3.853	**0.025**
Stroke severity at 1 year	8.60±5.27	9.36±3.93	13.00±6.56	1.728	0.183
Mean age	59.45±11.52	60.45±12.49	69.20±8.29	1.695	0.189

MRS-Modified Ranking Scale, SD-Standard Deviation, DBP-Diastolic Blood Pressure, SBP-Systolic Blood Pressure.

Table IV: Test of Collinearity

Model		*Unstandardised Coefficients*		*Sig.*	*Collinearity Statistics*	
		B	**Std. Error**		**Tolerance**	**VIF**
1	(Constant)	.545	.455	.234		
	No Of Medication	-.138	.133	.302	.968	1.034
	Diastolic Blood Pressure at 1 Year	-.001	.006	.879	.574	1.742
	Systolic Blood Pressure at 1 Year	.008	.004	**.036***	.568	1.759

Variance inflation factor (VIF) values for all variables< 5. There is no multicollinearity between variables.

Table V: Predictors of medication adherence in stroke patients

		Estimate	*Std. Error*	*Wald*	*Sig.*		*95% Confidence Interval*	
						Odds ratio	**Lower**	**Upper**
Threshold	High adherence	7.138	2.134	11.184	0.001*	1258.819	19.195	82554.770
	Medium adherence	8.573	2.218	14.933	<0.001*	5286.558	68.362	408820.305
Location	SBP at 1year	0.037	0.018	4.060	0.044*	1.037	1.001	1.075
	DBP at 1year	0.002	0.030	0.005	.941	1.002	0.944	1.064
	Antihypertensives							
	Monotherapy Polytherapy	1.160	0.653	3.154	0.076	3.189	0.887	11.469

Using the cumulative odds ordinal logistics regression with proportional odds, the PLUM procedure, in particular, a table showing predictors of levels of adherence

In the present study, participants demonstrated high adherence levels, particularly among those with SBP below 140 mmHg and DBP below 90 mmHg. [44,45] Additionally, the mean DBP and SBP were lower in participants with high adherence compared to those with low adherence. This suggests that BP management was more successful in the high adherence group, similar to previous research on BP control and medication adherence, which reported higher adherence rates were associated with better BP control. Hence, there appears to be a positive correlation between medication adherence and BP control. Consequently, there is a necessity for increased monitoring of medication usage to ensure optimal BP control. Stroke severity, cognitive status, family support, and cost of medications are some of the other factors that affect medication adherence to antihypertensive in people with stroke**.** Health care providers should emphasise and encourage stroke survivors on the importance of secondary prevention especially adhering to the use of their antihypertensive (s) to prevent repeat stroke and other complications. As such, the effort of health care professionals should be tailored towards ensuring medication adherence among stroke survivors to achieve optimal blood pressure control and prevent associated complications of suboptimal blood pressure.

The strength of this study lies in the fact that it is one of the few studies that focus on BP control among stroke survivors, as most studies have emphasised primary prevention. Apart from the cross-sectional design of the study, which makes causal relationships difficult to ascertain, the study focuses on stroke survivors who are alive at one year without taking cognisance of stroke survivors who died before one year. The study is limited by the fact that data on the socio-economic class, class of antihypertensive, comorbidities, and use of alcohol and tobacco were not obtained, as these could have increased the robustness of the discussion. Furthermore, the study did not explore other important factors such as cognitive function, social network, comorbidity index, pill burden, alcohol or substance abuse, level of formal education, and cost of medication that can affect medication adherence to antihypertensive medications.

Conclusion

The study revealed high medication adherence among stroke survivors. The SBP, DBP, and the number of antihypertensives received were associated with medication adherence at one year among stroke survivors. High medication

adherence was identified as associated with improved BP control among stroke survivors.

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