Blood Pressure Control among Hypertensive Stroke Survivors in Nigeria

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Background: Hypertension is the dominant risk factor for first-ever and recurrent stroke. The objective of the present study was to assess control of blood pressure (BP) among hypertensive stroke survivors seen at 2 tertiary hospitals in Nigeria. *Methods:* Using a cross-sectional design, stroke survivors with hypertension as a risk factor were consecutively recruited in the outpatient clinics of the participating hospitals. After the necessary demographic and clinical information had been obtained, participants had their BP assessed in a standardized manner. A BP of <140/< 90 mmHg was defined as good control. Univariate binary logistic regression analysis was performed to determine the predictors of good BP control. *Results:* There were 284 subjects with a mean age of 59.0 ± 13.1 years. The overall mean systolic blood pressure was 142.7 ± 22.5 mmHg (male 144.9 ± 22.7, female 138.4 ± 21.6; $P > .05$) while the overall mean diastolic blood pressure was 85.6 ± 14.5 mmHg (male 85.8 ± 14.6, female 85.2 ± 14.4; $P > .05$). In spite of the fact that 270 (95.1%) of the subjects were on antihypertensives, only 39.8% (male 37.0%, female 44.1%; $P > .05$) had good BP control. In univariate analysis, having at least 12 years of formal education (OR 1.672, 95% CI 1.035-2.699; $P < .05$) and good compliance to antihypertensive medications (OR 9.732, 95% CI 3.391-27.930; $P < .001$) were the only variables associated with good BP control. *Conclusions:* Control of BP is poor among Nigerian hypertensive stroke survivors and is associated with the level of formal education and drug compliance. Urgent measures are needed to improve on this poor BP control as these may potentially reduce stroke recurrence rate. **Key Words:** Stroke—stroke survivors—hypertension—blood pressure control—Nigeria.
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Introduction

Globally, stroke is the second leading cause of death and the third most common cause of disability-adjusted life-years with the burden of the disease being disproportionately higher in low- and middle-income countries (LMICs).[1-3] This devastating disease is rapidly becoming a serious health concern in many of these countries which are witnessing both epidemiologic and demographic transitions in spite of the fact that the battle against communicable diseases is far from being won.[4] While stroke incidence decreased by 42% in high-income countries in the last 4 1/2 decades, the incidence of the disease increased by greater than 100% in the LMICs during the same period.[5]

Hypertension, defined by the Seventh Joint National Committee as a systolic blood pressure (SBP) higher than 140 mmHg and diastolic blood pressure (DBP) higher than 90 mmHg,[6] is the most common modifiable risk factor for first-ever ischemic and hemorrhagic strokes.[7] It also remains probably the target dominant risk factor for secondary prevention in stroke survivors. There are compelling data from original studies and meta-analyses showing that control of blood pressure (BP) coupled with lifestyle modifications reduces the odds of having stroke recurrence.[8-11] Whether or not a tighter or more aggressive BP control is needed as a preventive measure against recurrent stroke continues to be debated. A meta-analysis of 11 randomized controlled trials with a total of 42,572 participants and 794 stroke events showed that patients with established cardiovascular disease at entry did not experience stroke risk reduction with a target BP lower than 130 mmHg.[12] However, a post hoc analysis of PROGRESS (Perindopril pROtection aGainst REcurrent Stroke Study) showed that the lowest risk of stroke recurrence was among the one quarter of patients with the lowest follow-up BP, although risk of recurrence rose progressively with higher follow-up BPs.[13] In spite of the foregoing, control of hypertension in stroke survivors remains a major issue of discourse.[14] A cross-sectional analysis of REGARDS (REasons for Geographic And Racial Differences in Stroke) study cohort showed that stroke survivors had higher rates of unrecognized cardiovascular risk factors with a significantly high percentage of them having unrecognized and/or undertreated hypertension.[15] In Nigeria, there is paucity of data on control of hypertension in stroke survivors despite the increasing burden of the disease and the obvious fact that inadequately controlled BP will potentially increase the burden of stroke by increasing the recurrence rate. Information is needed on BP control in lower- and middle-income countries where achieving BP control may be difficult due to poor access to healthcare and medication as a result of nonavailability or inadequate health insurance schemes. This cross-sectional study assessed BP control in hypertensive stroke survivors in 2 tertiary hospitals in Nigeria to provide information on the prevalence of uncontrolled BP as a first step toward development of a robust action plan for secondary prevention of stroke.

Methods

This was a cross-sectional study conducted between February 2009 and April 2011 at the neurology and cardiology clinics of University of Ilorin Teaching Hospital, Ilorin, and Federal Medical Centre, Yola, in the north central and north eastern regions of Nigeria, respectively. These 2 hospitals are tertiary healthcare facilities with neurology inpatient and outpatient services where stroke survivors are usually attended to for follow-up appointments. To obtain a 95% confidence interval (CI) of ±5% around an estimated good BP control rate of 50% among an estimated yearly cohort of 300 stroke survivors attending the neurology and cardiology clinics of the 2 participating hospitals, the calculated minimum sample size for the study was 168. Subjects consisted of consecutively consenting adult patients with a diagnosis of stroke as clinically defined by the World Health Organization[16] who were attending the outpatient clinics for follow-up during the study period. Included were stroke survivors who had arterial hypertension and suffered from stroke at least 30 days before enrollment. Both ischemic and hemorrhagic cases of stroke were included in the present study. Information was obtained by the researchers and trained research assistants who were resident doctors in the department of medicine of the 2 hospitals. An interviewer-administered questionnaire was used to obtain necessary information including demographic and social characteristics, family history of hypertension and stroke, and use of antihypertensive drugs and compliance to medications, among others. Good compliance to medications was defined as regular use of antihypertensive as prescribed by the managing physician. BP was measured by the auscultatory method with a mercury sphygmomanometer using appropriate adult-sized cuffs. With the subject seated, the BP was measured in the left arm after at least 5 minutes rest. The SBP was recorded at phase I Korotkoff sounds while the DBP was recorded at phase V Korotkoff sounds. Each BP was measured twice and the average was recorded as the final BP. Good SBP control was defined as SBP lower than 140 mmHg, good DBP control as DBP lower than 90 mmHg; while overall good control was defined as SBP and DBP lower than 140 mmHg and lower than 90 mmHg, respectively. Values above these cutoffs were defined as poor controls. As part of good clinical practice, all patients with poor BP control had medication or dosage adjustment with the aim of achieving the recommended target BP of <140/< 90 mmHg.

In accordance with the Helsinki Declaration, the present study on human subjects was approved by the Ethical Review Committee of the University of Ilorin Teaching Hospital. Data analysis was done with the Statistical Package for the Social Sciences version 20 (SPSS Inc., Chicago, IL). Frequency tables and charts were generated while appropriate measures of central tendency (means and/or median) were determined for continuous variables. For comparison of normally distributed continuous variables, the Student's *t* test was applied while the nonparametric Mann–Whitney *U* test was used for continuous variables that were not normally distributed. Categorical variables were compared using Pearson's chi-square test. Binary logistic regression analysis was used to determine the predictors of good BP control. The independent variables tested include age, sex, years of formal education (<12 years or ≥12 years), number of antihypertensive drugs (single or multiple), compliance to antihypertensive drugs (good or poor), and monthly income (<N50,000