Poststroke Hypertension in Africa

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Background and Purpose—Little is known about the frequency of hypertension and related knowledge in Africans who have had a stroke. The objective of this study was to determine the frequency of hypertension, its control, and associated knowledge among patients with and without a history of stroke at Uganda's main referral hospital.

Methods—Subjects with a history of stroke (n=157) were compared with stroke-free control subjects (n=149). Demographics and clinical characteristics were recorded and hypertension-related knowledge assessed by questionnaire. Multiple logistic regression including cases and control subjects was used to determine factors independently associated with blood pressure control and hypertension-related knowledge.

Results—A total of 69.4% of cases versus 54.7% of control subjects were hypertensive at the time of the research visit (*P*=0.001). Univariable analyses showed the odds of having good blood pressure control (OR, 0.53; 95% CI, 0.33–0.84; *P*=0.006) and good hypertension knowledge (OR, 0.35; 95% CI, 0.22–0.56; *P*<0.0001) were lower in cases. Age <40 years (*P*=0.002), good hypertension-related knowledge (*P*=0.002), and poorer medication adherence (*P*<0.0001) were independently associated with poorer blood pressure control. Those with a history of hypertension had better hypertension-related knowledge (*P*=0.001), but knowledge was poorer among cases (*P*<0.0001).

Conclusion—Hypertension is common in Ugandans with and without a history of stroke. Barriers to effective blood pressure control in Uganda other than patient knowledge need to be identified.   (***Stroke***. 2012;43:3402-3404.)

Key Words: Africa ■ case–control ■ hypertension ■ stroke

Stroke-related morbidity and mortality is higher in sub-Saharan Africa than in the developed world.[1] Hypertension is a major stroke risk factor with adequate treatment associated with 35% to 40% reductions in stroke incidence.[2] Hypertension control in sub-Saharan Africa, however, is generally poor.[1] Although patient involvement is critical for achieving adequate blood pressure (BP) control,[3] little is known about Africans' hypertension-related knowledge. The objectives of this study were to investigate the frequency of hypertension, its control, and associated knowledge among patients with and without a history of stroke attending a Ugandan tertiary care hospital's outpatient neurology clinic. The primary hypothesis was that the level of BP control in subjects who had a stroke would be associated with their hypertension-related knowledge.

Methods

This study was conducted at Mulago National Referral Hospital in Kampala, Uganda. Cases were identified from neurology records and defined as adults having the abrupt onset of a neurological deficit lasting >24 hours attributable to a vascular cause at least 1 month earlier and confirmed on brain CT scan. Control subjects were stroke-free adult outpatients (70% had infectious diseases). Control subjects were matched to cases by sex and age (±3 years). Patients declining to participate, unable to provide a reliable history, or with missing data (n=5) were excluded.

BP was averaged for 2 recordings (15-minute interval) with an automated sphygmomanometer with the subject seated. Hypertension was defined according to Joint National Committee guidelines (BP ≥140/90 mm Hg).[2] Poor BP control was defined as having a research visit BP ≥140/90 mm Hg among those with a history of hypertension.

A research assistant abstracted the subject's index stroke type, hypertension history, and chronic diseases from the medical record. Medication adherence, BP knowledge, and lifestyle information were obtained by questionnaire (online-only Data Supplement). Those indicating they never or rarely missed medications were considered adherent.

Subject knowledge was quantified by the number of correct answers in response to hypertension-related questions. Those with ≥75% correct responses were categorized as knowledgeable. Factors independently associated with good BP control and knowledge were identified using multiple logistic regression including both cases and control subjects. Statistical analyses were performed using SPSS Version 11.

The study was approved by the Makerere University Ethics Review Board, the Duke University Institutional Review Board, and Uganda National Council for Science and Technology. All subjects or their legal representative provided written consent.

Results

The average time between the index stroke and the research clinic visit was 24 months. Table 1 gives subject demographic and clinical characteristics. Cases were older and more commonly had a history of hypertension, diabetes, and chronic kidney disease and a research visit BP ≥140/90

Table 1. Study Group Characteristics

Characteristics	Cases, No. (%) (N=154)	Control Subjects, No. (%) (N=149)	P Value
Mean age, y (±SD)	58.4±16.0	52.1±13.3	<0.0001
Sex			
Male	61 (39.6%)	51 (34.2%)	0.332
Female	93 (60.4%)	98 (65.8%)	
Education level			
None/prehigh school	86 (56.6%)	78 (52.7%)	0.500
High school/university	66 (43.4%)	70 (47.3%)	
Hypertension history	119 (77.3%)	77 (52.4%)	<0.0001
Diabetes	78 (50.6%)	17 (11.4%)	<0.0001
Chronic kidney disease	19 (12.3%)	1 (0.7%)	<0.0001
Heart disease	6 (3.9%)	10 (6.7%)	0.267
Research visit BP ≥140/90 mm Hg	100 (64.9%)	81 (54.7%)	0.001

BP indicates blood pressure.

mm Hg. Cases and control subjects had similar levels of education.

Table 2 compares BP control and knowledge between those with and without a history of stroke. Cases were less likely to have good BP control and had poorer hypertension-related knowledge. Most cases knew the benefits of regular exercises (91.6%) and medication (79.2%) on BP control; however, only 3.9% knew the importance of diet (online-only Data Supplement Figure I). More than 90% of control subjects knew the importance of each. In the entire study population, knowledge of hypertension, its associated symptoms, and BP control increased with increasing levels of education (online-only Data Supplement Figure II). Only 42.2% of cases reported having a BP check in the previous 2 months; overall, 33% did not know whether they had hypertension.

Variables with $P<0.1$ in univariable analyses were included in multivariable models (Table 3). Age <40 years, good hypertension-related knowledge, and poorer medication adherence were independently associated with poorer BP control. A history of hypertension was independently

Table 2. BP Control and BP Knowledge Among Those With and Without a History of Stroke

	Cases	Control Subjects	Univariable OR (95% CI)*	P Value
BP control				
Poor	82 (53.2%)	56 (37.6%)	1	
Good	72 (46.8%)	93 (62.4%)	0.53 (0.33–0.84)	0.006
BP knowledge				
Poor	98 (63.6%)	57 (38.3%)	1	
Good	56 (36.4%)	92 (61.7%)	0.35 (0.22–0.56)	<0.0001

Poor BP control, research visit BP ≥140/90 mm Hg among those with a history of hypertension; good BP knowledge, ≥75% correct questionnaire responses.
BP indicates blood pressure.

Table 3. Multivariable Analyses of Good BP Control and Knowledge in Cases and Control Subjects

Variable	OR (95% CI)	P Value
Good BP control		
Age <40 y	0.18 (0.06–0.53)	0.002
Good hypertension knowledge	0.42 (0.24–0.72)	0.002
Stroke history	1.45 (0.78–2.71)	0.239
Poor medication adherence	0.33 (0.18–0.59)	<0.0001
Good BP knowledge		
Age <40 y	1.55 (0.69–3.51)	0.290
Hypertension history	2.81 (1.54–5.13)	0.001
Stroke history	0.24 (0.14–0.41)	<0.0001
Research visit BP ≥140/90 mm Hg	1.60 (0.94–2.70)	0.082

Good BP control, research visit BP <140/90 mm Hg among those with a history of hypertension; good BP knowledge, ≥75% correct questionnaire responses; n=303.
BP indicates blood pressure.

associated with better hypertension-related knowledge, but a history of stroke was associated with poorer knowledge.

Discussion

We found the frequency of having a research visit BP ≥140/90 mm Hg was higher in cases (64.9%) than in stroke-free control subjects (54.7%). Both frequencies are much higher than in a previous Ugandan study (30.5%).[4] This may, in part, be due to the advent of "fast foods" in the Ugandan diet.[5] The higher rates in our study might also be attributed to a growing impact of Uganda's lack of BP education and control programs. If the high frequency of hypertension in our control subjects is similar to the general Ugandan population, strategies aimed at BP control could have a major impact on stroke incidence in the country.

Consistent with other data from sub-Saharan Africa,[1] our subjects had strokes at a young age (mean, 55.8 years) compared with Western populations (mean, 69.3 years in blacks).[6] Lifestyle differences could be a possible explanation. Older individuals may be more likely to make and sustain lifestyle changes, especially regarding diet.[7] Alternatively, older patients in Uganda might not have adopted Western-style diets. We also found that younger patients with hypertension had poorer BP control, likely contributing to their higher stroke risk.

Lack of knowledge about hypertension impedes both primary and secondary prevention. Like in other populations, we found that higher levels of education were associated with better hypertension-related knowledge.[8] Despite similar education, however, our cases had poorer BP knowledge (only 3.9% of cases understood the importance of diet) than control subjects and more commonly had a research visit BP ≥140/90 mm Hg. The reason for poorer dietary knowledge in cases is not clear. Not surprisingly, those with a history of hypertension had better hypertension-related knowledge. Unexpectedly, better hypertension knowledge was independently associated with poorer BP control. These observations imply that the impact of knowledge alone on BP control may be

outweighed by other barriers and suggest that the problem may need to be addressed through improved education in addition to identification of other factors affecting compliance.[9]

This study does have limitations. Although conducted at Kampala's major referral hospital, this was a single-site study, and the results may not be generalizable to other settings in Africa. All studies involving subject questionnaires are subject to recall and other biases. Because CT confirmation was required, patients with small strokes might be excluded and those with severe strokes could not be interviewed or were missed because of the long interval between the stroke and research visit. Despite these limitations, our data suggest that hypertension may be very common in Ugandans with and without a history of stroke. Increased awareness of the impact of hypertension and its control are important public health and clinical goals. To be effective, our data suggest that barriers to treatment other than patient knowledge need to be identified.

Disclosures

None.

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