Stroke subtypes and factors associated with ischemic stroke in Kinshasa, Central Africa

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Abstract

Background and Purpose: Ischemic stroke causes death and disability worldwide. Better understanding and controlling factors associated will improve the prevention of the disease. This study reviews records of patients with ischemic stroke in Central Africa.

Material and methods: Patients of Bantu ethnicity with clinical diagnosis of stroke and lesion on computed tomography scan from January 2011 to December 2012 were selected. Computed tomographic subtypes of ischemic stroke and factors associated were considered with tropical seasonal variation.

Results: Of the 303 first-ever stroke patients (average age 53 years old, range 3-84 years old; 62% male) were included in the study. The prevalence of computed tomography stroke subtypes was: lacunar infarct (63%) and non lacunar infarct lesion (37%). Silent brain infarct was seen in 9% of patients. Prevalence of factors associated with ischemic stroke was: age≥60 years old (55%); male gender (63%), chronic and uncontrolled hypertension (54%) and type 2 Diabetes mellitus (11%). A seasonal high prevalence was observed in warmer season (p < 0.05).

Conclusions: This study shows a high prevalence of lacunar infarct than non lacunar in Bantu of Central Africa.

Keywords: Ischemic stroke, CT subtypes, Factors associated, Central Africans.

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Introduction

Stroke in sub-Saharan Africa is a major public health problem, with higher mortality than in developed countries and occurrence at a younger age1,2. The rates of the disease which were considerably lower, are now rapidly increasing, even doubling in regions such as rural South Africa3,4. The reasons for the high burden of stroke are linked to the high rates of chronic hypertension, type 2 diabetes mellitus (T2DM), excessive alcohol intake, smoking, insufficient fruit and vegetable consumption4,5,6,7,8,9,10,11,12,13,14,15,16. Also, stroke is more suffered than hemorrhagic stroke10,11,12,13,14,15,16. A large part of Africa as Central Africa was not included in the Interstroke Study phase 1, and a systematic evaluation of the risk factors in various ethnic groups and geographical locations is an effective global strategy to reduce the risk of premature stroke15. With the availability and accessibility of computed tomography (CT) and diagnostic accuracy, tomographic subtypes and factors associated with ischemic stroke were reviewed in Central Africa.

Materials and methods

We carried out a retrospective study of black patients who had clinical diagnosis of stroke with sudden onset of neurological deficit (face weakness, arm drift, hemiplegia, aphasia) with CT scan confirmation of ischemic stroke. The study was conducted at two radiology departments of a public and a private hospital in the urban Kinshasa City, Democratic Republic of the Congo (DRC), one of the poorest sub-Saharan country despite its potential of minerals. Patients living in rural areas were not included in this study. The data of the study were collected over a period of two years, between January 2011 and December 2012. The study was approved by the ethics committee of Kinshasa School of Public Health.

The CT examinations were performed within a week of symptoms onset in the usual way cuts 10 mm spaced 5 mm without injection of contrast material. Stroke subtypes assessed four OSCP (Oxfordshire Community Stroke Project Classification) subtypes classification13 was used with lacunar circulation infarct (LACI) and total anterior (TACI), partial anterior (PACI), posterior (POCI) circulation infarcts as non lacunar circulation infarct.

On CT, LACI was seen as a small, round, hypodense lesion of ≤ 25 mm along the course of penetrating arteries14. Non lacunar infarct was defined as a large area of hypodensity involving large vessel in the region of the vascular territory. Patients who suffered from transient ischemic attacks (TIA) defined as symptom resolution within 24 hours of onset and without detectable lesions on CT scan, were not considered. Factors associated with ischemic stroke included: age, gender, chronic arterial hypertension, type 2 diabetes mellitus (T2DM), cigarette smoking, alcohol intake, abdominal obesity. Tropical seasons assessed are a warm-er and rainy season (summer) from September 15th to May 14th, with temperatures ranging from 29.4 to 37.8°C and high humidity; and a cold season (winter) from May 15th to September 14th with temperatures ranging from 18.3 to 26.7°C, and low humidity.

Results

A total of 303 consecutive patients of Bantu ethnic group of all ages, regardless of sex were enrolled in the study.

Statistical analyzes of the data were performed with the software Epi Info version 6.4 and SPSS for Windows 10 and 16.

Table I. Factors associated with subtype of Ischemic infarct

<table>
<thead>
<tr>
<th>Factors associated (number of patient)</th>
<th>Lacunar infarct (number of patient)</th>
<th>Non lacunar infarct (number of patient)</th>
<th>Total</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age≥60 years</td>
<td>109</td>
<td>58</td>
<td>167/303 (55%)</td>
<td>0.05</td>
</tr>
<tr>
<td>Male gender</td>
<td>153</td>
<td>47</td>
<td>200/303 (63%)</td>
<td>0.07</td>
</tr>
<tr>
<td>Hypertension</td>
<td>127</td>
<td>62</td>
<td>189/303 (62%)</td>
<td>0.032</td>
</tr>
<tr>
<td>T2DM</td>
<td>13</td>
<td>20</td>
<td>33/303 (11%)</td>
<td>0.09</td>
</tr>
<tr>
<td>Hypertension+T2DM</td>
<td>8</td>
<td>9</td>
<td>17/303 (5.6%)</td>
<td>0.05</td>
</tr>
<tr>
<td>Smoking status</td>
<td>9</td>
<td>6</td>
<td>15/303 (5%)</td>
<td>0.05</td>
</tr>
<tr>
<td>Alcohol intake</td>
<td>10</td>
<td>12</td>
<td>22/303 (7%)</td>
<td>0.05</td>
</tr>
<tr>
<td>Abdominal obesity</td>
<td>0</td>
<td>2</td>
<td>2/303 (0.6%)</td>
<td>0.05</td>
</tr>
<tr>
<td>Raining season</td>
<td>142</td>
<td>76</td>
<td>218/303 (72%)</td>
<td>0.05</td>
</tr>
<tr>
<td>Others</td>
<td>12</td>
<td>14</td>
<td>26/303 (8.6%)</td>
<td></td>
</tr>
</tbody>
</table>

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Apart from history of chronic and uncontrolled hypertension observed in 127 patients (67%) with LACI vs. in 58 patients (51%) with the non lacunar infarct (p = 0.032), number of multiple ischemic lesions seen in 28 patients with 27 patients (9%) having lacunar infarct vs. 1 patient (1%) with non lacunar infarct, and location in basal ganglia, thalamus and white matter for LACI (84%) vs. parieto-occipital for non lacunar type (57%). This was most often found in the parietal lobe (73.6%) for Obajimi et al. Potter et al. and Bailey et al. found lesions occurring more often in the internal capsule and caudate nucleus. In our study (Table 1), we noted a strong association of a history of chronic and uncontrolled hypertension with all subtype of ischemic stroke. It was noticed in 67% of cases of LACI vs. 51% in non lacunar type (p = 0.032). It was the most important associated factor found in this study. In Africa, increased rate of hypertension is often attributed to westernization of life style and stress of urbanization9, and uncontrolled hypertension to the low socioeconomic status.

The T2DM was in 11% of cases and both in 5.6% of patients. In the study conducted in Ghana18, the T2DM was an important associated factor and was found in 63% of cases, while hypertension was found in only 9.1% of cases studied. These two factors are also found in African Americans19-21. Horowitz et colleagues reported that in a cohort of 108 patients with LACI, hypertension was present in 68%, diabetes mellitus in 37%; both occurred in 28% and neither occurred in 23%19. In this central African study, hypertension and T2DM both occurred in less than 6%. Other factors associated with these two types of ischemic stroke were age ≥ 60 years (55%), male gender (63%) and the rainy, warmer season (72%). Age and male gender are known as predisposing factors in the world. The two risk factors most strongly related to a diagnosis of stroke in the study of Hege Ihle-Hansen et al in Norway24 were current smoking and hyperlipidemia. In the western part of Africa in Nigeria, Femi et al.25 in a recent study carried out in 2012, Song et al.26 found similar proportion in race distribution of LACI and non lacunar stroke using magnetic resonance imaging (MRI) based evaluation including diffusion-weighted imaging (DWI). Our finding may be attributed to the fact that our patients suffered of chronic hypertension which affects small vessels of the brain.

We found that 28 patients (9 %) with two or more ischemic lesion on CT scan. Obajimi et al found the 9.3 % in 2002 in Ghana25, Putala et al.26 found 15% of SBI in 655 MRI-scanned patients aged 15 to 49 with first-ever ischemic stroke. In the Northern Manhattan Study, Willey et al.27, found 16% of SBI in the physical ly active population. This fact may attest that some of these stroke lesions may have been silent, pauci-symmetric, non specific or patients don't seek attention.

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We found that LACI was observed in 63 % of 303 black patients versus 37% of non lacunar infarct with a significa nt difference. In USA, several studies have examined the difference in frequency of ischemic stroke subtypes by race. Blacks are more prone to small vessel stroke than Whites9. LACI accounts for 20 to 25% of all ischemic strokes3,4, and this proportion is the highest in the African Americans than in the white population12,13. In a recent study carried out in 2012, Song et al.26 found similar proportion in race distribution of LACI and non lacunar stroke using magnetic resonance imaging (MRI) based evaluation including diffusion-weighted imaging (DWI). Our finding may be attributed to the fact that our patients suffered of chronic hypertension which affects small vessels of the brain.

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