Estimation of the Risk of Stroke in Black Populations in Barbados and South London

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Background and Purpose—The incidence of stroke in black populations is a public health issue, but how risk varies between black communities is unclear.


Results—Two hundred and seventy-one cases registered in SLSR and 628 cases in BROS. Average age of stroke was 66.1 years (SD 13.7) in SLSR and 71.5 years (SD 14.9) in BROS (P<0.001). The incidence rate/1000 population in SLSR was 1.61 (European adjusted; 95% CI, 1.41 to 1.81) and 1.08 (world adjusted; 95% CI, 0.95 to 1.21). For Barbados incidence rates were 1.29 (European adjusted; 95% CI, 1.19 to 1.39) and 0.85 (world adjusted; 95% CI, 0.78 to 0.92). Overall IRR for SLSR: BROS adjusted for age and sex was 1.26 (95% CI, 1.09 to 1.46). Statistically significant subtype differences included total anterior cerebral infarction (IRR, 1.82; 95% CI, 1.23 to 2.69), posterior cerebral infarction (IRR, 2.12; 95% CI, 1.28 to 3.53), primary intracerebral hemorrhage (IRR, 1.56; 95% CI, 1.03 to 2.35) and subarachnoid hemorrhage (IRR, 5.04; 95% CI, 2.54 to 9.97).

Conclusions—The risk of stroke in black Caribbeans is higher in South London than Barbados, and particularly so for specific stroke subtypes. The risk in Barbados approaches that in the white population in South London and strokes occur at an older age. Whether environmental factors mediate these differences in migrant populations requires further study. (Stroke. 2006;37:1986-1990.)

Key Words: ethnicity ■ incidence ■ stroke

People categorized as black have higher stroke incidence rates than whites in the UK and the US, with an approximate 2-fold increased risk compared with white groups regardless of the country or ethnicity of the black group and as such ethnicity is an important public health issue.1–4

Reports in the Caribbean have estimated the incidence of first in a lifetime stroke yet no comparisons between black communities in different settings, particularly where migration may have occurred, have been reported.5,6 The incidence rates reported in Barbados and Martinique would appear to be lower than the rates in black groups in the UK and US. The focus of research has been to address risk factor profiles in black and white groups to understand what may drive this increased risk. A case control study in South London highlighted differences in the population attributable risk for ischemic stroke.7 In the white population there was a high attributable risk for smoking, ischemic heart disease and atrial fibrillation, whereas in the black Caribbean group the attributable risk was significantly higher for hypertension and diabetes. In South London, England and Barbados identical population-based stroke registers have separately reported incidence rates, and this study compares the overall rates and impact of stroke subtypes in the 2 distinct settings, and the influence of sociodemographic and risk factors on stroke risk.

Methods

The South London Stroke Register (SLSR), a population-based stroke register recording first ever strokes in patients of all age groups for a defined area of South London, was set up in January 1995. Southeast London is a deprived inner city area of a developed country with 13% black Caribbean population. All registrations between January 1995 and December 2002 were selected for this analysis, and this includes all the data presented in 2 previous publications on incidence in South London.2,3 An identical register, the Barbados Register of Strokes (BROS), was set up in October 2001, and records between October 2001 and October 2003 were
used. Barbados is an island of 166 square miles and a population of 269 000 comprising 95.6% black population. Identical multiple sources of notification were used to ascertain cases that included hospitals, primary care, imaging reports, rehabilitation and death certificates. Ethical approval was obtained from the Guy’s and St. Thomas’ Hospital Trust, Kings College Hospital, Queens Square, Westminster Hospital (London) and the Medical Research Ethics Committee of Barbados Ministry of Health (Barbados).

The World Health Organization (WHO) definition of stroke was used. Ethnicity was recorded at the initial assessment using self-definition of ethnic origin (1991 UK census question was used for SLSR patients and 2000 Barbados national census for BROS). The principal analyses were restricted to black Caribbeans and mixed ethnicity black Caribbean/whites only. Mixed ethnicity was included because there are issues of categorization of ethnicity by individuals; mixed ethnicity may not be known about and it is highly prevalent.

Stroke Subtypes

Classification of the pathological subtype (cerebral infarction, primary intracerebral hemorrhage, and subarachnoid hemorrhage (SAH)) was based on results from at least 1 of the following: brain imaging, cerebrospinal fluid analysis or necropsy examination. Cases without pathological confirmation of stroke subtype were unclassified. The Oxford Community Stroke Project (OCSP) clinical classification of stroke was also used, cerebral infarction being categorized as total anterior cerebral infarction, partial anterior cerebral infarction, posterior cerebral infarction (POCI) and lacunar infarction (LACI). A review of diagnostic subtypes was undertaken by A.R. Wolfe et al Risk of Stroke in Black Populations 1987

Results

The SLSR registered 2321 patients with first in a lifetime stroke. Of these, 1138 (49.0%) were male and 1183 (51.0%) were female; 414 (17.8%) were black and 112 (4.8%) of other ethnic origins with 74 (3.2%) of unknown ethnic origin. There were 270 black Caribbeans and 1 mixed black Caribbean/white patient, these having a mean age at first stroke of 66.1 years (range 27.8 to 95.6, SD 13.7). The number of patients having brain imaging was 230 (84.9%).

BROS registered 665 patients. These comprised 282 (42.4%) males and 383 (57.6%) females; 30 (4.5%) were white, 578 (86.9%) were black Caribbean, 50 were mixed black Caribbean/white (7.5%), 2 (0.3%) of other ethnic origins with 5 (0.8%) of unknown ethnic origin. For the 628 black Caribbean and mixed patients, the mean age at first stroke was 71.2 years (range 16.7 to 103.7, SD 14.9). BROS patients were 5.5 years older on average than SLSR patients (95% CI, 3.4 to 7.6; P<0.001). The number of patients having brain imaging was 599 (95.4%).

The crude total incidence rates/1000 population were 1.36 (95% CI, 1.20 to 1.52) for SLSR (Table 1) and 1.31 (95% CI, 1.21 to 1.42) for BROS (Table 2). After age adjustment to a European population the incidence for SLSR was 1.61 (95% CI, 1.41 to 1.81) and BROS 1.29 (95% CI, 1.19 to 1.39). The overall incidence rate ratio with adjustment for age and gender (SLSR:BROS) was 1.26 (95% CI, 1.09 to 1.46).

For both SLSR and BROS, European age-adjusted incidence rates were higher in males than in females (SLSR P=0.010, BROS P=0.002; Tables 1 and 2). For both SLSR and BROS incidence increased with age, rising rapidly from around 45 years in males and females. For patients aged 55 to 64, incidence was approximately double for males compared with females in both SLSR (P=0.068) and BROS (P<0.001). In BROS, female incidence was almost double that of males for those aged 85 years or more.

TABLE 1. Annual Stroke Incidence Rate Per 1000 (IR) by Age Group and Gender for the Combined Black Caribbean and Mixed Population of Barbados, 2001–2003

<table>
<thead>
<tr>
<th>Age Group, y</th>
<th>Male</th>
<th>Female</th>
<th>All</th>
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<tbody>
<tr>
<td>&lt;15</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
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<tr>
<td>15–24</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
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<tr>
<td>25–34</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
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<tr>
<td>35–44</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
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<tr>
<td>45–54</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>55–64</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>65–74</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
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<tr>
<td>75–84</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
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<tr>
<td>85+</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
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<tr>
<td>Total</td>
<td>0.00</td>
<td>0.00</td>
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</table>
Table 3 shows a comparison of risk factors for the SLSR and BROS patients. Current smoking was less common in BROS (26.7% in SLSR versus 8.0% in BROS; \(P<0.001\)), along with high alcohol intake (females: ≥14 U/week, males: ≥21 U/week; 8.4% in SLSR versus 4.5% in BROS; \(P=0.031\)).

Table 4 compares the distribution of stroke subtypes in SLSR and BROS. Of the 271 SLSR strokes, 191 (70.5%) were infarctions compared with 521 of 628 (83.0%) in BROS. Over half (52.8%) of strokes in BROS were LACIs, whereas in SLSR they account for 28.0%. However, POCIs were relatively uncommon in BROS (9.2% in SLSR versus 5.7% in BROS).

Hemorrhages formed a greater proportion of strokes in SLSR with 61 (22.5%) versus 81 (12.9%) in BROS. SAHs were particularly uncommon in BROS (13/628 (2.1%) versus 9.2% in BLSR). The overall rate was higher for SLSR (IRR, 1.26; 95% CI, 1.09 to 1.46). Statistically significant subtypes were total anterior cerebral infarctions (IRR, 1.82; 95% CI, 1.23 to 2.69), POCIs (IRR, 2.12; 95% CI, 1.28 to 3.53), primary intracerebral hemorrhage (IRR, 1.56; 95% CI, 1.03 to 2.35) and SAH (IRR, 5.04; 95% CI, 2.54 to 9.97). LACIs had a higher incidence in Barbados (IRR, 0.78; 95% CI, 0.60 to 1.01).

**Discussion**

This study assesses the incidence of stroke in a developed and developing black Caribbean setting using identical, jointly developed methodologies that includes detailed phenotyping of the stroke and recording of underlying sociodemographic circumstance and stroke risk factors. The study clearly demonstrates that the risk in the Caribbean setting is similar to the world standard population distribution because both SLSR and BROS have an age distribution closer to that of the former. The overall rate was higher for SLSR (IRR, 1.26; 95% CI, 1.09 to 1.46). Statistically significant subtypes were total anterior cerebral infarctions (IRR, 1.82; 95% CI, 1.23 to 2.69), POCIs (IRR, 2.12; 95% CI, 1.28 to 3.53), primary intracerebral hemorrhage (IRR, 1.56; 95% CI, 1.03 to 2.35) and SAH (IRR, 5.04; 95% CI, 2.54 to 9.97). LACIs had a higher incidence in Barbados (IRR, 0.78; 95% CI, 0.60 to 1.01).

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<tr>
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<tr>
<td></td>
<td>Incidence Rate</td>
<td>Incidence Rate</td>
</tr>
<tr>
<td></td>
<td>(95% CI) [No.]</td>
<td>(95% CI) [No.]</td>
</tr>
<tr>
<td>TACI†</td>
<td>0.14 (0.11–0.18) [73]</td>
<td>0.27 (0.18–0.35) [42]</td>
</tr>
<tr>
<td>PACI</td>
<td>0.27 (0.22–0.32) [137]</td>
<td>0.30 (0.20–0.39) [48]</td>
</tr>
<tr>
<td>POCl†</td>
<td>0.08 (0.05–0.11) [36]</td>
<td>0.15 (0.09–0.21) [25]</td>
</tr>
<tr>
<td>LACI</td>
<td>0.57 (0.50–0.65) [275]</td>
<td>0.44 (0.33–0.54) [76]</td>
</tr>
<tr>
<td>Cerebral infarction</td>
<td>1.07 (0.97–1.17) [521]</td>
<td>1.15 (0.97–1.32) [191]</td>
</tr>
<tr>
<td>Primary intracerebral hemorrhage†</td>
<td>0.14 (0.11–0.18) [68]</td>
<td>0.24 (0.15–0.32) [36]</td>
</tr>
<tr>
<td>SAH†</td>
<td>0.03 (0.01–0.04) [13]</td>
<td>0.12 (0.07–0.17) [25]</td>
</tr>
<tr>
<td>Unclassified</td>
<td>0.04 (0.03–0.06) [25]</td>
<td>0.07 (0.03–0.10) [11]</td>
</tr>
<tr>
<td>All strokes†</td>
<td>1.29 (1.18–1.39) [628]</td>
<td>1.62 (1.42–1.83) [271]</td>
</tr>
</tbody>
</table>

†TACI indicates total anterior cerebral infarction; PACI, partial anterior cerebral infarction.
†Statistically significant difference \((P<0.05)\) between Barbados and London.
that described in white populations in the developed world and that the risk in a Caribbean population in inner London is significantly higher and at a younger age.

Stroke is a major public health issue worldwide both in developing and developed countries and the indicators used by the WHO are based on routinely collected mortality data. In these reports London is considered part of a developed country and Barbados a developing country, and this is why such a definition has been adopted here. The evidence that the incidence of stroke in black communities is worse than in non-black communities comes mainly from the US and suggests that minority groups have higher rates or more severe strokes, but variations in prognosis for clinical outcomes other than mortality remain less certain. However, more evidence is required on regional ethnic variations in treatments and outcomes.

We have previously separately reported the incidence of first in a lifetime stroke in the settings of South London and Barbados using the same stroke register methodology, yet no detailed and formal comparisons have been undertaken. This combined analysis presented here clearly demonstrates the increased risk in black Caribbeans who in the main migrated from the Caribbean and Guyana from the 1950s onwards to London. It demonstrates that risk does not remain the same regardless of setting but supports findings from the field of cardiovascular disease that migrants do take on additional risk in their new settings and are at increased risk of death. In London stroke occurs 5 years younger and the overall IRR is 26% higher in London, with much increased risk of hemorrhagic stroke, and posterior and total anterior circulation infarcts and reduced risk of lacunar stroke. An interesting observation was the markedly increased risk of SAH, which may be attributable to a higher prevalence of hypertension and smoking in South London. A weakness of the study is that we did not record the island from which the SLSR patients came or whether they were born in the UK. We were also unable to estimate the effect of “years lived” in South London on risk, although analyses would be confounded by many factors such as risk factor prevalence and environmental factors. These data would support the contention that stroke in black populations is not mainly attributable to genetic considerations.

Comparison of risk factors for stroke between the settings was limited to the main behavioral and physiological factors, and other important ones such as body mass index and cholesterol were not included. The effect of diet on risk was also not feasible in such a study. There appeared to be no excess of any risk factor in the Barbados group, whereas smoking, excessive drinking and ischemic heart disease were more prevalent in South London. Abbotts et al used the Health Survey for England data to illustrate how Caribbeans are potentially at increased risk of cardiovascular disease compared with the white population. They demonstrated that Caribbean men smoked more but had higher mean high-density lipoprotein cholesterol levels and Caribbean women had greater body mass index and lower mean triglyceride levels. Harding showed that the strongest predictors of stroke in Caribbeans resident in the UK were duration of residence and age at migration. Gillum has suggested stages of epidemiological evolution of patterns of cardiovascular disease among black people of sub-Saharan African origin. These essentially show increasing development of atherosclerotic pathology and risk until finally this is reduced when better prevention and treatment are in place. Differences in some of the major risk factors for stroke have been demonstrated in similar ethnic groups, in different settings, and it would be reasonable to expect differences in stroke risk. The findings from this study do show a poorer risk factor profile in the South London group with increased risk of stroke.

Another interpretation of these observed differences includes differential ascertainment of strokes, with underascertainment in Barbados. Multiple sources of ascertainment were used with a substantial proportion being registered at home, indicating good coverage by the field workers in Barbados. There is no gold standard for ascertainment, but intense surveillance of all sources in Barbados by a doctor and public health nurse ensures as complete ascertainment as possible.

Overall, this study has raised issues about the risk of stroke in different countries for black Caribbeans that clearly support the view that within populations of similar genetic stock living in different settings, disease risk varies, and this variation is likely to be driven by environmental factors. This is consistent with previous data which examined variation in risk factor profile. The overall risk factor profile of stroke patients is worse in South London, and probably reflects Westernization, because ischemic heart disease, smoking and hypertension are more prevalent. With Westernization being observed in Caribbean populations the risk of stroke may well increase over the next few years in Barbados. Unfortunately, the effect of the years of exposure to a new culture and environment could not be assessed in the study. Further studies are needed to follow-up cohorts of blacks in different settings to assess the risk of stroke and the effect of exposure to a broad range of risk factors and environmental factors. The increased risk of stroke in South London is a public health issue that requires targeted interventions that are culturally sensitive to reduce the impact of this disease in ageing populations.
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Disclosures
The sponsors had no role in the design and conduct of the study; collection, management, analysis, or interpretation of the data; nor any role in preparation, review, or approval of the manuscript.

References
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