Stroke in South West Nigeria
A 10-Year Review

S.A. Ogun, FWACP; F.I. Ojini, MBBS, FMCP; B. Ogungbo, FRCS; K.O. Kolapo, MMCP, MWACP; M.A. Danesi, MRCP, FWACP, FMCP

Background and Purpose—Stroke is a significant economic, social, and medical problem worldwide. This retrospective follow-up study aimed to review the pattern, types, and case fatality of stroke in Nigeria.

Methods—Records of all stroke patients admitted into Ogun State University Teaching Hospital (OSUTH), Sagamu, from December 1993 to November 2003 were reviewed. Patients were classified into hemorrhage or infarct using the World Health Organization criteria. Information was obtained as to the time of death in those who died and case fatality at 24 hours, 7 days, 30 days, and 6 months recorded. Autopsy records were also reviewed.

Results—A total of 708 stroke patients were reviewed and this constituted 2.4% of all emergency admissions. On clinical grounds, 49% of the patients had cerebral infarction (CI) and 45% had intracerebral hemorrhage (ICH), whereas 6% had subarachnoid hemorrhage. Stroke constituted 1.8% of all deaths at the emergency unit and the case fatality was 9% at 24 hours, 28% at 7 days, 40% at 30 days, and 46% at 6 months.

Conclusion—Stroke constitutes a significant cause of mortality and the need for prompt institution of intensive treatment is emphasized. A changing pattern with an increasing frequency of hemorrhagic stroke in our population is suspected. However, because this was a retrospective study based on clinical examination in a highly selected stroke population, neuroimaging confirmation would be needed for any future prospective hospital or population-based studies. (Stroke. 2005;36:1120-1122.)

Key Words: fatal outcome ■ frequency ■ stroke

Stroke is a significant economic, social, and medical problem all over the world. The incidence of stroke is increasing worldwide and it is the third leading cause of death in most industrialized countries.1–3 The incidence and prevalence of stroke have not been established in Nigeria. However, a report from a Stroke Registry in Ibadan gave the annual incidence of stroke in Nigerians as 26 per 100 000 populations.4 More recent reports suggested an increasing incidence but because these were hospital-based studies, they could be inaccurate.5,6 The frequency of stroke in hospital populations has varied from 0.9% to 4.0%, whereas among neurological admissions, stroke accounted for 0.5% to 45%.6 At the Lagos University Teaching Hospital (LUTH), stroke was the commonest cause of neurological admissions,5 whereas at the Ogun State University Teaching Hospital (OSUTH), it was the third commonest cause of medical admissions.7 At the University College Hospital (UCH) Ibadan, LUTH, and OSUTH, stroke accounted, respectively, for 5%, 8%, and 17% of medical deaths.6–8 Stroke therefore appears to be a huge problem in Nigeria and places a major financial burden on the inadequate health services in the country.

In Nigeria, cerebral ischemia (CI) accounted for 64%, (ICH) for 19%, and subarachnoid hemorrhage for 6% of all strokes;4 however, more recently, a changing pattern with an increasing frequency of hemorrhagic stroke has been suspected.5 It is with this background that this study reviewed the pattern, types, and trend in case fatality of stroke over a 10-year period. Autopsy data were reviewed to determine the stroke types in those who died.

Materials and Methods
Records of all patients admitted to OSUTH, Sagamu, over a 10-year period from December 1993 to November 2003 were reviewed. The case notes of patients admitted into the Accident and Emergency unit and the medical wards with clinical diagnoses of stroke (first and recurrent) during the study period were retrieved and reviewed by 2 consultants and 1 senior registrar (S.A.O., F.I.O., K.K.O.) in the Division of Neurology. A questionnaire was designed to extract relevant clinical data from the case records. The questionnaire recorded the age, sex, date of admission, time of death, accompanying symptoms, stroke type, and the predisposing factors. Only those who had complete information and met the World Health Organization criteria for the clinical diagnosis of stroke were included.

An attempt was also made to classify patients into hemorrhagic or infarct on clinical grounds5 because CT scan facilities were not

Received October 5, 2004; final revision received November 29, 2004; accepted March 15, 2005.
From the Department of Medicine (S.A.O., K.O.K.), Ogun, State University Teaching Hospital, Sagamu, Ogun State, Nigeria; the Department of Medicine (F.I.O., M.A.D.), Lagos University Teaching Hospital, Lagos state, Nigeria; and the Division of Neurosurgery (B.O.), Newcastle General Hospital, Newcastle-upon-Tyne, UK.
Correspondence to Dr S. A. Ogun, Department of Medicine, Ogun State University Teaching Hospital, Sagamu, Ogun State, Nigeria, PO Box 1333, Ikorodu, Lagos state, Nigeria. E-mail yomiogun@skannet.com
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Stroke is available at http://www.strokeaha.org DOI: 10.1161/01.STR.0000166182.50840.31
available at the time of the study. The World Health Organization criteria have a higher diagnostic accuracy (71%) than the Siriraj stroke score (54.2%) when compared with CT scan as the gold standard and showed moderate agreement ($k=0.41$), whereas the Siriraj stroke score showed no agreement ($k=0.18$) with CT scan.

A patient was classified as having CI if there was an acute onset of focal neurological deficit with or without impairment of consciousness, which may have been preceded by a transient ischemic attack, occurred at rest or with normal or mild elevation of the blood pressure, and there was no associated headache or vomiting. The cerebrospinal fluid was usually clear. Intracerebral hemorrhage, however, occurred during activity with a rapidly changing neurological deficit and impairment of consciousness. There was moderate to severe elevation of the blood pressure and the cerebrospinal fluid may have been bloody; vomiting and headache were common but previous transient ischemic attack was uncommon.

### Setting
OSUTH is a tertiary health facility situated in Sagamu, a semi-urban town with a population of ~200,000 (2002 census). It serves as a referral center in Ogun State for all towns in the state, as well as the adjoining parts of Lagos and Oyo states. It has 240 beds distributed among the various specialties, with 40 inpatients beds for medical admissions: 20 for females and 20 for males.

Patients were admitted mostly through the Accident and Emergency department and the medical outpatient clinics, and subsequently transferred to the medical wards usually within 24 hours of arrival at the hospital. Surviving patients were discharged to the medical outpatient clinic for follow-up, whereas those lost to follow-up within 6 months of onset were traced to their homes by the community nurses; in case of death, the date of death was recorded.

Autopsy data were reviewed and information obtained as to the time of death and stroke type in those who died. All deaths occurring within 24 hours of hospital arrival had an autopsy except when consent was denied as in Muslim faithfuls. The case fatality at 24 hours, 7 days, 30 days, and 6 months was recorded.

Patients were maintained on adequate hydration with intravenous infusion of isosorbide/hypertonic fluid, free radical scavengers, anti-platelet drugs and antihypertensives if indicated, as well as physiotherapy. Dexamethasone or mannitol was seldom used.

### Statistics
Data analyses were performed by standard statistical methods using Epi-Info 2002.

The procedures followed were in accordance with the OSUTH institutional guidelines and the institutional review committee approved the study and the subjects (or relations) gave informed consent.

### Results
Over a 10-year period, 29,314 patients were seen at the Accident and Emergency unit, of whom 708 (2.4%) had stroke diagnosed (Table 1). Three hundred forty-four (48.6%) patients had CI and 320 (45.2%) had ICH. Forty-four patients (6.2%) had subarachnoid hemorrhage and were excluded from further analysis.

Of the 344 patients with CI, 155 were males and 189 were females, giving a male:female ratio of 1:1.2. The age range was 27 to 96 years, with a mean of 61.5±3.7 and a mode of 69. Of the 320 with ICH, 147 were males and 175 were females, giving a male:female ratio of 1:1.2. The age range was 30 to 120 years, with a mean of 75±5.0 and a mode of 65. The peak age was the seventh decade for both stroke types. This was followed by the eighth decade for cerebral infarction and the sixth and fifth decades for intracerebral hemorrhage (Table 2).

Three thousand one hundred ninety patients admitted into the Accident and Emergency died in the first 24 hours (10.9%), and of these 60 (1.9%) were patients with stroke (Table 1). The case fatality for stroke was 9% in the first 24 hours, 28% at 7 days, 40% at 30 days, and 46% at 6 months.

### Table 1. 24-Hour Case Fatality of Stroke at the Adult Accident and Emergency

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<td></td>
<td>183</td>
<td>1434</td>
<td>2959</td>
<td>2197</td>
<td>2995</td>
<td>2954</td>
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<td>2757</td>
<td>2997</td>
<td>4472</td>
<td>4870</td>
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<td>Admitted</td>
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<td></td>
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<td>29314</td>
</tr>
<tr>
<td>No. of stroke patients, (%)</td>
<td>20 (11)</td>
<td>56 (3.9)</td>
<td>56 (1.9)</td>
<td>48 (2.2)</td>
<td>116 (3.9)</td>
<td>100 (3.9)</td>
<td>20 (1.4)</td>
<td>52 (1.9)</td>
<td>96 (3.2)</td>
<td>72 (1.7)</td>
<td>Total stroke patients (1993–2002)</td>
</tr>
<tr>
<td>Total No. of deaths (%)</td>
<td>12 (6.6)</td>
<td>290 (20.2)</td>
<td>273 (9.2)</td>
<td>396 (18)</td>
<td>326 (11)</td>
<td>338 (11.4)</td>
<td>185 (12.4)</td>
<td>309 (11.2)</td>
<td>348 (11.6)</td>
<td>419 (9.4)</td>
<td>Total deaths (1993–2002)</td>
</tr>
<tr>
<td>No. of stroke deaths (%)</td>
<td>8 (4.3)</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td>4 (1)</td>
<td>12 (3.7)</td>
<td>12 (3.6)</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td>8 (1.9)</td>
<td>Total stroke deaths (1993–2002)</td>
</tr>
<tr>
<td>% Case fatality for stroke</td>
<td>4.3%</td>
<td>0.18%</td>
<td>0.18%</td>
<td>0.8%</td>
<td>0.4%</td>
<td>0.4%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>Total stroke deaths (1993–2002)</td>
</tr>
</tbody>
</table>

### Table 2. Age Distribution and 6-Month Case Fatality in Patients With CI/ICH

<table>
<thead>
<tr>
<th>Age, y</th>
<th>No. of Patients With Cerebral Infarct</th>
<th>No. of Deaths</th>
<th>Case Fatality, %</th>
<th>No. of Patients With Cerebral Hemorrhage</th>
<th>No. of Deaths</th>
<th>Case Fatality, %</th>
<th>No. of Patients With Stroke</th>
<th>No. of Deaths</th>
<th>Case Fatality, %</th>
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</thead>
<tbody>
<tr>
<td>20–29</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
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<tr>
<td>30–39</td>
<td>24</td>
<td>20</td>
<td>83</td>
<td>8</td>
<td>0</td>
<td>0</td>
<td>32</td>
<td>20</td>
<td>62.5</td>
</tr>
<tr>
<td>40–49</td>
<td>48</td>
<td>28</td>
<td>58</td>
<td>12</td>
<td>0</td>
<td>0</td>
<td>60</td>
<td>28</td>
<td>47</td>
</tr>
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<td>50–59</td>
<td>68</td>
<td>44</td>
<td>65</td>
<td>36</td>
<td>12</td>
<td>33</td>
<td>104</td>
<td>56</td>
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<tr>
<td>60–69</td>
<td>116</td>
<td>100</td>
<td>86</td>
<td>116</td>
<td>20</td>
<td>17.2</td>
<td>232</td>
<td>120</td>
<td>52</td>
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<tr>
<td>70–79</td>
<td>44</td>
<td>28</td>
<td>64</td>
<td>108</td>
<td>16</td>
<td>152</td>
<td>44</td>
<td>29</td>
<td>62.5</td>
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<tr>
<td>80–89</td>
<td>8</td>
<td>8</td>
<td>100</td>
<td>52</td>
<td>12</td>
<td>23</td>
<td>60</td>
<td>20</td>
<td>33</td>
</tr>
<tr>
<td>90–99</td>
<td>8</td>
<td>8</td>
<td>100</td>
<td>4</td>
<td>4</td>
<td>100</td>
<td>12</td>
<td>12</td>
<td>100</td>
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<tr>
<td>Older than 100</td>
<td>4</td>
<td>4</td>
<td>100</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>4</td>
<td>4</td>
<td>100</td>
</tr>
<tr>
<td>Total</td>
<td>320</td>
<td>240</td>
<td>75</td>
<td>344</td>
<td>64</td>
<td>18.6</td>
<td>664</td>
<td>304</td>
<td>45.8</td>
</tr>
</tbody>
</table>
A total of 318,888 deaths were recorded in the hospital over the 10-year period. Of these, 861 had autopsies, giving an autopsy rate of 0.27% for all hospital deaths. Of the 60 stroke patients who died over the same period, only 5 had autopsies, giving an autopsy rate of 0.8% for stroke. The pathological diagnosis was CI in 3 and ICH in 2 patients.

Discussion

This study has shown that stroke constituted 2.4% of emergency admissions at the OSUTH and is comparable to the frequency of 3.7% of medical admissions at LUTH. The lower frequency reported in this study could be because of a higher proportion of road traffic accident victims in the emergency department as a result of its strategic location.

Pathological pattern of stroke are different in various races because of variations in admission policy, diagnostic accuracy, age distribution, and related risk factors, and changing patterns have been reported in several communities including Nigeria. In Oxford, cerebral ischemia comprises >80% and ICH occurs in 10% to 15% of all strokes. However, a high proportion (21% to 48%) of stroke type among American blacks and individuals of Chinese and Japanese ancestry is ICH. In our study, ischemic stroke accounted for 49%, whereas hemorrhagic stroke accounted for 45%. Although uncertain, this finding suggests a changing pattern of the stroke subtype with an increasing proportion of hemorrhagic stroke in our population. It is possible that the increasing frequency of uncontrolled hypertension, as well as other risk factors, in our population could be responsible.

The 6-month case fatality of 46% in this study is comparable to the case fatality of 58% for hemorrhagic stroke populations, but it is again uncertain if this was a reflection of the high proportion of ICH recorded in our population, or because more patients with severe cases sought medical attention in the hospital. However, it is unlikely that the high case fatality was because of admission of only severe cases, because all stroke cases (including transient ischemic attacks) were routinely admitted.

Worldwide, stroke remains a major cause of death, despite advances in its management. In this study, it constituted 1.9% of deaths at our emergency unit, although this is lower than the frequency of 4.6% and 17% among medical admissions at UCH and OSUTH, respectively. The higher proportion of deaths caused by road accident victims could be contributory. Stroke, acute myocardial infarction, and acute trauma rank highest as entities needing ambulatory emergency services, and there is a need for improved emergency care of stroke patients, just as is stressed for the other 2 conditions. Multidisciplinary care of stroke patients is needed at all times with structured organization of the entire stroke chain, from the prehospital phase, through the emergency room, to the stroke unit. The eponym “acute brain attack,” emphasizing the need for urgent action, should be strengthened. However, the use of recombinant tissue plasminogen activator in ischemic stroke within 3 hours of onset appears to be impracticable in Nigeria because of delayed presentation.

The case fatality of 28% at 7 days, 40% at 30 days, and 46% at 6 months are comparable to the 26%, 41.2%, and 86%, respectively, reported at LUTH, although our 6-month case fatality is lower. All these would suggest stroke as a continuing cause of mortality at all times, and the causes of death in these patients need to be analyzed. Preventive measures for extracerebral complications should be strengthened beyond the first 7 days.

In conclusion, this study revealed that stroke is a common entity in African Nigerians and remains a significant cause of mortality at all times beyond the onset. The need for intensive care of patients with stroke was emphasized. Although uncertain, a changing pattern of our stroke population with increasing frequency of hemorrhagic stroke is suspected. However, because this was a retrospective study based on clinical examination in a highly selected stroke population, neuroimaging confirmation is advised for future prospective hospital- and population-based studies in our setting.

Acknowledgments

The authors hereby acknowledge the immense contributions of Drs Osalu, Sotusan, Tope Ladi-Akinyemi, and Agbola for providing the raw data for the study. The secretarial efforts of Kemi, Tope Akinkuowo, and Folasho Dankuwo are also acknowledged.

References

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Stroke. 2005;36:1120-1122; originally published online May 5, 2005;
doi: 10.1161/01.STR.0000166182.50840.31
Stroke is published by the American Heart Association, 7272 Greenville Avenue, Dallas, TX 75231
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Print ISSN: 0039-2499. Online ISSN: 1524-4628

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