The Epidemiology of Stroke In An Urban Black Population

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SUMMARY Hospital admissions for acute stroke were monitored over a twelve month period. Only patients age 20 and over were studied. Out of a population at risk of 114931 there were 116 cases, giving an overall incidence of 1.01 admissions per 1000 population per year over age 20. Cerebral hemorrhages were present in 32.8%, large artery thromboses in 31.9%, cerebral embolism in 13.8% and lacunar infarctions in 20.7% of cases. Atrial fibrillation was the presumed cause of cerebral embolism in 6.9% of patients. Hypertension was present in 69.8% of patients. Further studies are needed to establish the characteristics of stroke in the Third World.

The Kalafong Hospital fees are proportional to the income of the patient, so that the indigent receive free medical care. This is important in excluding economic causes of non-attendance.

Diagnosis

The diagnostic classification and criteria were those of the Harvard Cooperative Stroke Registry.16 Primary subarachnoid hemorrhage was, however, excluded from this study as this category was routinely referred directly to the Department of Neurosurgery. The diagnostic categories of large artery thrombosis, lacunar infarction, cerebral embolism and intracerebral hemorrhage were thus used. Diagnosis was confirmed by one or more of the following investigations where possible and appropriate: computerized axial tomography (CT) (performed on a Siemens Somatom DR2), angiography, digital subtraction imaging, bidirectional Doppler examination of the carotid vessels, lumbar puncture and autopsy. Other investigations routinely performed were: complete blood count, urea and electrolytes, erythrocyte sedimentation rate, serological tests for syphilis, antinuclear antibodies, serum glucose, serum cholesterol and triglycerides, urinalysis, chest x-ray and ECG. Further tests were performed on an individualized basis.

Risk Factors

Hypertension was diagnosed on the basis of a history of sustained hypertension requiring medical treatment, as confirmed by hospital records, or on the basis of end-organ involvement, namely left ventricular enlargement, retinopathy or renal involvement in the absence of a more likely etiology. Hypertension was defined as a systolic pressure above 160 mm Hg or a diastolic pressure above 95 mm Hg.

Patients were assessed clinically and electrocardiographically for ischemic heart disease.

Period of Study

The study began on May 1, 1984 and the results are reported through April 30, 1985.

Results

There were 121 patients admitted with the suspected diagnosis of stroke. The diagnosis was found to be
incorrect in five patients: one patient had an astrocytoma, one a metastatic tumor and three were found to have subdural hematomas. Of the remaining 116 patients 65 were male and 51 female.

Annual Incidence

The total of 116 patients out of a population at risk of 114931 age 20 years and over gives an incidence rate of 1.01 admissions for a newly-occurred stroke per 1000 population per year. There was a marked rise in incidence with age, with a peak in the male group at 65 to 74 years (see table 1). The apparent decline thereafter is probably an artefact caused by lower hospital attendance in the older age groups.

Diagnostic Category

In the group of 116 patients with stroke, 92 CT scans were performed, there were 11 angiograms (two by digital subtraction imaging), 2 Doppler investigations of the carotid vessels, 20 lumbar punctures and 3 autopsies. Diagnosis in 17 cases was made on clinical history and examination alone, without laboratory aid. Of these, 14 were presumed to be hemorrhages and three to be thromboses.

The strokes by type showed cerebral hemorrhages in 32.8%, large artery thromboses in 31.9%, cerebral embolism in 13.8%, lacunar infarctions in 20.7% and unspecified in 0.9% of patients. There was little difference in the type of stroke between the two sexes (see table 2). The unspecified patient left hospital to attend a witch-doctor practice before an accurate diagnosis could be made.

Case Fatality

The one month case fatality rate for the group as a whole was 33.6% and for cerebral infarctions was 22.4%. The latter included the large artery thromboses, cerebral emboli and lacunar infarctions. The case fatality rate for cerebral hemorrhages was 57.9% at one month.

Risk Factors

A history and/or target organ evidence of hypertension was found in 69.8% of patients. This does not include the 10.3% of patients who had only hypertensive readings on admission, which may be a reflection of reactive hypertension. Of the group with evidence of hypertension, only 56.9% showed hypertensive readings on admission while 12.9% were normotensive.

Atrial fibrillation was the presumed cause of cerebral embolic infarction in 8 patients, or 6.9% of the stroke group.

No patient had any evidence of ischemic heart disease.

Discussion

Incidence

The observed rate of 1.01 admissions per 1000 population per year for all acute stroke cases is a minimum reflection of the true incidence rate of stroke in this population group. A number of patients probably do not reach hospital because of transport difficulties or mistrust of Western medicine, preferring the traditional tribal healer. Other causes of non-attendance and non-referral are probably comparable with other hospital-based studies.

The apparent decline in age-specific incidence in males age 75 years and over is probably an artefact of hospital attendance. The apparent lower rates for females age 75 years and over is probably an artefact of hospital attendance. The apparent lower rates for females must also be accepted with reserve. This may be due to a subcultural artefact. In this regard Osuntokun from Nigeria has remarked that "In most African countries, the males come more readily to hospital (than the females). . ." It may be significant, however, that a study in Ibadan, Nigeria has reported both a lower incidence in people eighty years old and over, and a markedly lower incidence rate for females than for males.

Diagnostic Category

The diagnosis of stroke by type appears to demonstrate a high incidence of cerebral hemorrhage (32.8%).

Table 1: Age-Specific Incidence (per 1000 population) of Stroke Admissions

<table>
<thead>
<tr>
<th>Age</th>
<th>Male Population</th>
<th>Male Admissions</th>
<th>Male Incidence</th>
<th>Female Population</th>
<th>Female Admissions</th>
<th>Female Incidence</th>
<th>Total Population</th>
<th>Total Admissions</th>
<th>Total Incidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>20-54</td>
<td>52739</td>
<td>22</td>
<td>0.42</td>
<td>45416</td>
<td>10</td>
<td>0.22</td>
<td>98155</td>
<td>32</td>
<td>0.33</td>
</tr>
<tr>
<td>55-64</td>
<td>4562</td>
<td>16</td>
<td>3.51</td>
<td>5077</td>
<td>11</td>
<td>2.17</td>
<td>9639</td>
<td>27</td>
<td>2.8</td>
</tr>
<tr>
<td>65-74</td>
<td>2036</td>
<td>21</td>
<td>10.31</td>
<td>2621</td>
<td>18</td>
<td>6.87</td>
<td>4657</td>
<td>39</td>
<td>8.37</td>
</tr>
<tr>
<td>75 and over</td>
<td>1006</td>
<td>6</td>
<td>5.96</td>
<td>1474</td>
<td>12</td>
<td>8.14</td>
<td>2480</td>
<td>18</td>
<td>7.26</td>
</tr>
<tr>
<td>20 and over</td>
<td>60343</td>
<td>65</td>
<td>1.08</td>
<td>54588</td>
<td>51</td>
<td>0.93</td>
<td>114931</td>
<td>116</td>
<td>1.01</td>
</tr>
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</table>

Table 2: Classification of Strokes by Type

<table>
<thead>
<tr>
<th></th>
<th>Hemorrhage</th>
<th>Large Artery Thrombosis</th>
<th>Embolus</th>
<th>Lacuna</th>
<th>Unspecified</th>
</tr>
</thead>
<tbody>
<tr>
<td>Males Number of cases</td>
<td>21</td>
<td>22</td>
<td>8</td>
<td>13</td>
<td>1</td>
</tr>
<tr>
<td>Percentage</td>
<td>32.3%</td>
<td>33.8%</td>
<td>12.3%</td>
<td>20%</td>
<td>1.5%</td>
</tr>
<tr>
<td>Females Number of cases</td>
<td>17</td>
<td>15</td>
<td>8</td>
<td>11</td>
<td>0</td>
</tr>
<tr>
<td>Percentage</td>
<td>33.9%</td>
<td>29.4%</td>
<td>15.7%</td>
<td>21.6%</td>
<td>0%</td>
</tr>
<tr>
<td>Total Number of cases</td>
<td>38</td>
<td>37</td>
<td>16</td>
<td>24</td>
<td>1</td>
</tr>
<tr>
<td>Percentage</td>
<td>32.8%</td>
<td>31.9%</td>
<td>13.8%</td>
<td>20.4%</td>
<td>0.9%</td>
</tr>
</tbody>
</table>
as compared to that found in a study in South Alabama (14%).2 In a Nigerian study the incidence of cerebral hemorrhage was found to be 15.7%.6 These figures are not directly comparable, since in the present study the diagnosis of primary subarachnoid hemorrhage was excluded, which would tend to both decrease the apparent total incidence of stroke, and proportionately enlarge the remaining categories. It is not mentioned whether CT scanning was employed in the Nigerian study. The absence of CT scanning would also tend to underestimate the percentage of small intracerebral hemorhages.

A lower percentage of the patients in the present group had large artery thromboses (31.9%) than in the black group in the South Alabama study2 (46%), as well as in the Nigerian study6 (46.3%). There was also a smaller percentage of patients with cerebral emboli in the Pretoria study (13.8%) than in the black South Alabama group (26%), while in the Nigerian study a figure of 2.5% is reported. The percentage of lacunar infarctions appears to be slightly higher in the Pretoria group (20.7%) than in the South Alabama group (13%), and this diagnostic category was not used in the Nigerian study. The remarkable difference in the figures for cerebral embolism between this study and that from Nigeria might be contained in the figure of 24.2% of "acute but ill-defined cerebrovascular disease" reported in the Nigerian study. The precise importance of these apparent differences should await confirmatory evidence from other studies from the African continent. This is especially so in view of the widely differing methods of case ascertainment, inclusion/exclusion criteria, diagnostic categories, availability of special investigations, reliability of census data, and probably even willingness of the patient to report for treatment in the studies discussed above.

Risk Factors

Hypertension is putatively a major risk factor for cerebral hemorrhages and lacunar infarctions. The finding of an apparent high incidence of hypertension in these patients is in agreement with the experience in Nigeria.5 It is tempting to link the high proportion of this type of stroke in this series with the apparent high incidence of hypertension in these patients. However caution should be exercised before reaching these conclusions. Although hypertension appears to be practically unknown in certain rural districts in South Africa,16 in 1980 Seftel, Johnson and Muller1 reported an estimated 40 to 70% prevalence of hypertension in urban blacks over the age of 40 years. This suggests that hypertension may not be as significant a risk factor as it appears from the raw data. However, since no strict control group is available, the final decision in this regard must be postponed.

Atrial fibrillation was the presumed cause of cerebral embolism in 6.9% of the group. This is similar to the figure of 5.6% reported by Harrison and Marshall.6 Detailed studies of the various types of strokes in Third World and developing countries should be launched as soon as possible. This may help to trace the evolution of strokes as urbanization and Westernization takes place and could provide important clues for the future development of preventive medicine programs in the Third World.

Acknowledgments

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References

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