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 INCIDENCE RATES for strokes and the pathological subtypes appear to be different for the black and white populations. These differences have been analyzed in a number of American studies, and in 1979 a population-based study reported on the incidence of stroke in Ibadan, Nigeria.

Several studies have indicated that there is a high incidence of hypertension in blacks. On the other hand, there is a low incidence of ischemic heart disease in South African blacks. A pathological study has suggested that atherosclerosis occurs frequently in the cerebral arteries of this population and rarely in the coronary arteries.

This study was undertaken to assess the incidence and subtypes of stroke in a black population.

Methods

Study Population

An attempt was made to study all patients with strokes occurring during the study period, who were admitted to hospital. No distinction was made between first and subsequent strokes since an adequate history in this regard was frequently lacking. Patients who were admitted to hospital with strokes from the Atteridgeville and Mamelodi suburban areas of Pretoria, South Africa, were studied prospectively. These two areas have a total population of 233980, with a population census. (See table 1.)

Case Ascertainment

Kalafong hospital is situated in Atteridgeville and provides all the in-patient care for the study area. By arrangement, the Department of Internal Medicine admitted all suspected cases of stroke. A simple referral mechanism allowed rapid transfer of the patient to the Neurology service. The great majority of the patients was assessed by the author within three days of admission. When a patient died before this process was complete, the clinical notes were reviewed by the author, and a presumptive diagnosis was made.

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Only patients age 20 years and over were admitted to the study. 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. 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...
of hypertension, only 56.9% showed hypertensive readings on admission while 12.9% were normotensive. Of the group with evidence of reactive hypertension. Of the group with evidence of hypertensive, 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.

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 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>2.80</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>
</tbody>
</table>

### Table 2: Classification of Strokes by Type

<table>
<thead>
<tr>
<th>Type</th>
<th>Male Number of cases</th>
<th>Male Percentage</th>
<th>Female Number of cases</th>
<th>Female Percentage</th>
<th>Total Number of cases</th>
<th>Total Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hemorrhage</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Large Artery Thrombosis</td>
<td>21</td>
<td>32.3%</td>
<td>17</td>
<td>33.3%</td>
<td>38</td>
<td>32.8%</td>
</tr>
<tr>
<td>Embolus</td>
<td>8</td>
<td>13.8%</td>
<td>8</td>
<td>15.7%</td>
<td>16</td>
<td>13.8%</td>
</tr>
<tr>
<td>Lacunar</td>
<td>13</td>
<td>20.4%</td>
<td>11</td>
<td>18.2%</td>
<td>24</td>
<td>18.2%</td>
</tr>
<tr>
<td>Unspecified</td>
<td>1</td>
<td>1.5%</td>
<td>0</td>
<td>0%</td>
<td>1</td>
<td>0%</td>
</tr>
</tbody>
</table>
as compared to that found in a study in South Alabama (14%). In a Nigerian study the incidence of cerebral hemorrhage was found to be 15.7%. 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 hemorrhages.

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 study (46%), as well as in the Nigerian study (46.3%). There was also a smaller percentage of patients with cerebral embol 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 series 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. 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, in 1980 Seftel, Johnson and Muller 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. 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.

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References

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