First-Ever Stroke Incidence and 30-Day Case Fatality in the Sicilian Aeolian Archipelago, Italy

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Background and Purpose—Not many data on stroke epidemiology come from studies on islands. This is the first report on a Mediterranean archipelago population.

Methods—Using recommended criteria, from July 1, 1999, to June 30, 2002, information was collected on first-ever stroke and 30-day case fatality in Aeolian island residents (13 431).

Results—The overall crude incidence rate was 154 of 100 000 (95% CI, 118 to 197; 128 in men and 180 in women) or 180, 154, and 87, if adjusted to the Italian, European, and world populations, respectively. The 30-day case fatality rate was 24.2% (95% CI, 14.22 to 36.75).

Conclusions—Besides genetic or dietary factors, our results may reflect local, limited possibilities of diagnosis and management for stroke patients. (Stroke. 2005;36:2738-2741.)

Key Words: epidemiology ■ incidence ■ stroke

Although stroke epidemiology is investigated worldwide,1,2,3 few studies have been performed on islands.4,5,6 This is the first report providing comparable data on stroke in a Mediterranean archipelago population.

Subjects and Methods

The Aeolian archipelago (116.1 km²) includes 7 volcanic islands off the northeast Sicilian coast. The climate is typically Mediterranean. In-migration and out-migration is very limited. At the 2001 census, the study population (13 431) was not significantly different from the Italian population (Figure). Moreover, it had not changed very much in the last 10 years (+1% comparing Census 1991 with 2001). Agriculture, fishing, and tourism are the main activities.

Medical care (free of charge) is supplied only by the National Health Service (NHS) through 10 general practitioners (GPs), 10 first aid stations, and a general hospital without computed tomography (CT) equipment. The nearest NHS referral centers (in Sicily) are Milazzo, with a neurological division and CT equipment, and Messina, with multiple facilities.

The study was based on “standard ideal criteria,” including World Health Organization (WHO) definition, first-ever-in-a-lifetime stroke, complete case ascertainment based on multiple overlapping sources, and prospective study design.1 It was performed from July 1, 1999, to June 30, 2002, thanks to the full cooperation of all Aeolian physicians and GPs in particular, who were trained to fill in a clinical schedule to notify the team of suspected stroke cases. Whenever possible, patients were hospitalized in our neurology unit in Messina to undergo assessment. In nonhospitalized patients, diagnosis was based mainly on the reports of local doctors after all potential cases had been revised and discussed with them. To achieve complete case ascertainment, we contacted GPs monthly and verified: Aeolian first aid station and hospital registries; records of mobile emergency services; admission and discharge lists from the island general hospital, the medical and neurological hospital divisions in Milazzo and Messina and from the university departments of medical (including geriatric unit) and neurological sciences (including neurology, neurosurgery, and intensive care unit) in Messina; and death certificates of Aeolian residents.

Crude incidence rates together with 95% CIs for single binomial proportions were calculated by the exact approach (2001 census). Standardized rates were obtained by the direct method with 10-year age grouping of the Italian, European,7 and WHO world population8 as standards, and CIs, by assuming Poisson Distribution (No. of events over time) as model. Correlations between risk factors and stroke type were conducted in 2×2 tables either by χ² or by the Fisher exact approach.

Results

A first-ever stroke was confirmed in 62 of 92 cases (mean age 72.5±9.92; range 46 to 91 years of age), 26 men (mean age 71.5±10.3; range 53 to 91 years of age), and 36 women (mean age 74.6±9.61; range 46 to 90 years of age). Among them, 51 (82.2%) were hospitalized and had brain CT examinations. Of the 30 excluded patients, 16 had transient ischemic attacks (TIAs), 8 recurrent stroke, and 6 other
pathologies. The overall crude incidence rate was 154 of 100 000 (95% CI, 118 to 197) or 180 (95% CI, 154 to 208), 154 (95% CI, 130 to 180), and 87 (95% CI, 69 to 107), if adjusted to the Italian, European, and world populations, respectively. Age- and sex-specific incidence rates are detailed in Table 1. Forty-two patients (67.8%) had cerebral infarction, 8 (12.9%) intracerebral hemorrhage, 1 (1.6%) subarachnoid hemorrhage, and 11 (17.7%) ill-defined stroke.

No significant associations were found between risk factors, including hypertension (62%), cardiopathy (29%), diabetes mellitus (26%), hyperlipidemia (16%), atrial fibrillation (12%), previous TIAS (6%), and cigarette smoking (20%), and both major stroke types.

The overall 30-day case-fatality rate was 24.2% (95% CI, 14.22 to 36.75), 23.1% in men (95% CI, 8.97 to 43.65), and 25% in women (95% CI, 12.12 to 42.20). Six men and 9 women (mean age 79.2; range 52 to 90±9.9 years of age) died within 30 days because of the qualifying stroke (n=12) or cardiovascular events (n=3). Among them, 8 had ill-defined, 4 ischemic, and 3 hemorrhagic stroke.

### Table 1. Age and Sex-Specific Incidence Rates for First-Ever Stroke (cases per year per 100 000) in the Aeolian Archipelago

| Age Group, y | Males | | Females | | Both Sexes | |
|--------------|-------|------------------|-------|------------------|-------|
|              | Cases, Persons/y | Rates 95% CI | Cases, Persons/y | Rates 95% CI | Cases, Persons/y | Rates 95% CI |
| <45          | 0      | 0                | 0      | 0                | 0      | 0       |
| 45–54        | 2      | 66 (10.0–239.4)  | 3      | 116 (2.9–338.3)  | 5      | 89 (5.0–208.1) |
| 55–64        | 2      | 94 (11.4–338.3)  | 1      | 50 (10.0–278.1)  | 3      | 73 (3.0–211.9) |
| 65–74        | 14     | 788 (431.6–1319.0) | 15     | 711 (10.0–278.1) | 29     | 746 (15.0–211.9) |
| 75–84        | 6      | 877 (398.6–1170.4) | 11     | 1021 (10.0–278.1) | 17     | 965 (15.0–211.9) |
| >84          | 2      | 889 (322.6–1899.4) | 6      | 1389 (15.0–211.9) | 8      | 1218 (15.0–211.9) |
| Total        | 26     | 128 (83.6–187.5)  | 36     | 180 (126.2–249.3) | 62     | 154 (134.3–197.2) |
| Adjusted to Italian population | 146 | 212 (102.2–146.8) | 180 | 159.3–213.7 | 130.6–180.3 |

95% CI overlapping rejects significant statistical differences at 0.05 level.
TABLE 2. Incidence Rates of First-Ever Stroke in the Age Groups 55–84 Years (cases per year per 100 000) of Some Comparable Studies, Standardized to European and to WHO World Standard Population 2000 to 2025

<table>
<thead>
<tr>
<th>Study</th>
<th>Year</th>
<th>European Case Fatality</th>
<th>WHO World Standard Case Fatality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aeolian Islands (Italy)</td>
<td>1999 to 2002</td>
<td>490 (434.86–549.45)</td>
<td>454 (413.20–497.74)</td>
</tr>
<tr>
<td>South London (United Kingdom)</td>
<td>1995 to 1996</td>
<td>457 (416.58–500.88)</td>
<td>444 (403.66–487.28)</td>
</tr>
<tr>
<td>Arcadia (Greece)</td>
<td>1993 to 1995</td>
<td>538 (493.43–585.44)</td>
<td>514 (470.52–560.42)</td>
</tr>
<tr>
<td>Vibo Valentia (Italy)</td>
<td>1996</td>
<td>554 (508.82–602.11)</td>
<td>514 (470.52–560.42)</td>
</tr>
<tr>
<td>Frederiksborg (Denmark)</td>
<td>1989 to 1990</td>
<td>643 (594.25–694.68)</td>
<td>623 (575.03–673.90)</td>
</tr>
<tr>
<td>L’Aquila (Italy)</td>
<td>1994</td>
<td>704 (652.95–757.98)</td>
<td>664 (614.49–716.48)</td>
</tr>
<tr>
<td>Melbourne (Australia)</td>
<td>1995 to 1996</td>
<td>776 (722.35–832.57)</td>
<td>735 (682.82–790.11)</td>
</tr>
</tbody>
</table>

95% CIs in parentheses.


References


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