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IV. 研究成果の刊行物、別刷

Surveillance and measuring trends of stroke in Japan: The Takashima Stroke Registry (1988 – present)

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Stroke surveillance

Disease surveillance provides essential information that can be used for designing effective prevention strategies, appropriate allocation of health resources, assessment of effectiveness of the health programs, etc. Disease registries for chronic diseases, including stroke, are essential in determining the incidence and trends in a particular population.

Takashima Stroke Registry

The Takashima Stroke Registry is an integrated part of the ongoing Takashima Cardio-cerebrovascular Disease Registry, a disease registration system for stroke and acute myocardial infarction established in Japan in 1988. The registration study is a population-based prospective, observational study whose objective is to measure trends in the incidence and case fatality of stroke and to compare them with other populations within and outside Japan.

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Geographical setting

Figure 1 shows Takashima County, Shiga prefecture in the map of Japan. Takashima County is located in the predominantly rural area of Shiga prefecture in a central area of Japan. It is primarily composed of mountainous rural areas. The largest freshwater lake in Japan, Biwako Lake, is located to the east of Takashima County. Weather in the Shiga follows four very distinct seasons: winter, spring, summer, and autumn, with significant seasonal fluctuations.

Population characteristics

Table 1 shows the characteristics of the residents of Takashima County. It is a farming community with inhabitants mainly classified culturally into the same subgroup and has similar standards of living. The population has remained fairly stable during the 16-year study period, with a population of 55 451 (49.2% male and 50.7% female) in the year 2000 (1), with 22.3% of the population aged 65 years or more.

Case finding and registration process

Takashima County contains two community hospitals: Takashima General Hospital, a public facility with 261 beds located in the south of the county, and Makino Hospital, a private facility with 72 beds located in the north. Additionally, there is also a geriatric hospital, Imazu Hospital, which is the only dedicated facility for

elderly people in the county. It has been estimated that approximately 98% of all hospital admissions are seen at these community hospitals (2). The remaining patients are seen at three tertiary care hospitals: Shiga University of Medical Science Hospital and Otsu Red Cross Hospital in Otsu City, and Shiga Medical Center for Adults in Moriyama City, which have more sophisticated facilities for advanced treatment. These are located outside the county but within the Shiga prefecture.

Registered patients included all residents of the county who were hospitalized with stroke in the two community hospitals and the geriatric hospital. Also, the patients who are residents of Takashima County but were hospitalized with a stroke at any of the three tertiary hospitals outside the county were also included. Internist and specialist investigative personnel trained by neurologists and epidemiologists carried out both the case finding and registration of patients who met the criteria. Before final decisions on inclusion in the registry, physicians and epidemiologists checked the records for absolute verification for eligibility. Registration procedures were investigated once every 3 months at the six facilities. We registered all cases that met the inclusion criteria (2, 3) on the basis of the medical records from all the relevant hospitals inside and outside the county and the county ambulance records. We used the registration form of the Monitoring System for Cardiovascular Disease commissioned by the Ministry of Health and Welfare, Japan (3). Registered stroke pa-

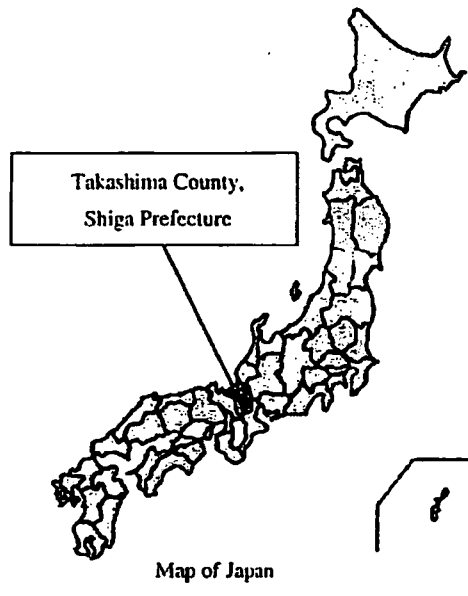


Fig. 1 Location of Takashima County, Shiga prefecture in Japan

Table 1 Population characteristics of the Takashima Stroke Registration area, Takashima County, Shiga, Japan*

Characteristics	Takashima County Number
Population Total	55 451
Gender	
Men	27 323 (49.2%)
Women	28 128 (50.7%)
Age group	
Aged up to 14 years	8 720 (15.7%)
14-64 years	34 360 (62.0%)
Aged 65 years or more	12 354 (22.3%)
Sex ratio (males per 100 females)	94.9
Population density	
Total land area	511 km ²
No. people per hectare (total land area)	1.08
No. people per hectare (total dwellable area)	4.70
Industrial Population	
Primary [†]	1 871 (5.8%)
Secondary [‡]	10 470 (38.1%)
Tertiary [§]	15 145 (55.1%)

*Data are based on the 2000 population census of Japan (1). (age unknown 16)

[†]Primary: agriculture, fishing, forestry, etc.

[‡]Secondary: industry sector.

[§]Tertiary: service sector.

Monitoring System for Cardiovascular Disease commissioned by the Ministry of Health and Welfare, Japan (3). These criteria are in accord with the World Health Organization's MONICA (Monitoring of Trends and Determinants in Cardiovascular Disease) (4) projects. These define a stroke as a sudden onset of neurological symptoms, which continue for a minimum of 24 h or result in death. Early case fatality was defined as patients who died within 28 days of the onset of a stroke event. The diagnosis of stroke type was based on clinical symptoms as well as computed tomography (CT) scans. A cerebral infarction was defined as a region of low-density absorption on a CT scan. An intracerebral hemorrhage was defined on the basis of a region of high-density absorption in the causal region due to a hematoma as shown on a CT scan. A subarachnoid hemorrhage was defined on the basis of a region of high-density absorption in the cerebrospinal fluid due to a hemorrhage as shown on a CT scan. Patients who satisfied clinical symptoms of acute stroke but whose type of stroke could not be determined based on clinical signs and/or CT scan results were labeled having as unclassified stroke. Cerebral infarction was classified as either cerebral thrombosis or cerebral embolism.

Items recorded at the registration of a stroke were:

- the date and time of the event,
- the situation and symptoms during the event,
- the extent of neurological symptoms during the event,
- clinical observations during the event (e.g., blood pressure, presence of fibrillation, level of consciousness, impairment of neurological function),
- past medical history,
- family medical history,
- smoking history,
- alcohol use,
- early (within one week) rehabilitation,
- fatality (within 28 days),
- cause of death,
- recurrence in acute stage, and
- CT scan observations.

On admission to hospital, patients were also examined for abnormal lipids and kidney function. Items investigated

tients were monitored annually by death certificates. Original death certificates were reviewed at the county health center with the approval of the Ministry of Public Management, Home Affairs, Post and Telecommunications, Japan, and the General Affairs Office of Japan in order to

establish cause of death. Patients' privacy was protected.

Stroke diagnostic criteria

The stroke diagnostic criteria used in this study are those established for the Mon-

Table 2. Stroke cases within the Takashima Stroke Registration System area, Takashima County, Shiga, Japan (1988–2002)

Characteristics	Stroke cases
Registered stroke cases	1750
Total	
Men	937 (53.5%)
Average age of men	69.4 years
Women	813 (46.5%)
Average age of women	74.4 years
Up to 64 years	434 (24.8%)
65 years and older	1316 (75.2%)
Stroke subtype	
Cerebral infarction	1177 (67.3%)
Intracerebral hemorrhage	380 (21.7%)
Subarachnoid hemorrhage	167 (9.5%)
Unclassified	26 (1.5%)

in the CT scan were the size of regions of low-density absorption in association with cerebral infarction, and the size of regions of high-density adsorption in association with cerebral hemorrhage. Cerebral angiography was used to investigate cerebral aneurysms and anomalies in the cerebral venous system, and secondary cerebral infarctions associated with subarachnoid hemorrhage.

Registered events

The Takashima Stroke Registry is an ongoing disease registry that has been compiling stroke cases since 1988. A total of 1750 (53.5% men and 46.5% women) cases have been recorded in the registry as of 2002. The majority of the stroke cases were of infarction type (67.3%), followed by hemorrhagic type (21.7%), of stroke. Table 2 shows the stroke cases of Takashima Stroke Registration System by gender, age, and sub-type.

Comprehensiveness

The comprehensiveness of the registration system for cardio-cerebrovascular diseases such as stroke is essential to determine the incidence and trends in a particular area (4, 5). A system to capture all patients in the study area, together with an accurate diagnosis, is required to ensure the comprehensiveness of the re-

gistration (6, 7). Factors that reduce the comprehensiveness of a register include missing cases or cases lacking a confirmed diagnosis, patients being admitted to hospitals outside the registration area, and non-registration. The quality of our registration system was assured by its completeness. Our registry system was planned to capture all the cases in the study area by covering all the hospitals of the county. It has been estimated that more than 98% of all hospital admissions of Takashima County are seen in these institutions (2). To ensure that eligible patients hospitalized outside the county were not omitted, registration procedures were also conducted at three high-level medical facilities outside the county.

In Japan, almost 100% of residents are covered by health insurance under the control of the Ministry of Health and Welfare (2, 8). Therefore, people with mild stroke who visited general physicians in the community are almost always referred to secondary- or tertiary-level hospitals for extensive investigations. In addition to this, a 24 h, round-the-clock emergency ambulance service is available for all residents without charge. The usual practice in Japan is to take patients with any acute disease conditions to emergency facilities. Thus, we believe that few patients would be left out of our registration system.

Most of the stroke cases in Japan are referred to hospitals for admission and CT scans are performed on more than 90% of the admitted cases, even in rural areas (2, 9). The strength of this study is the accuracy of the diagnostic investigations, which allows almost complete categorization of stroke sub-type. The two major hospitals in Takashima County both have CT facilities. Therefore, we believe that identification of stroke cases within the study area was almost complete and stroke diagnosis and classification was accurately recorded.

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