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Incidence and Survival Rate of Stroke in a Japanese Rural Area.

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ABSTRACT

Since 1966, the Oyabe Health Center (with a population of about 48,000) in Toyama prefecture, Japan has kept a register of patients with stroke living in the area within its jurisdiction. In the 8 years from 1977 to 1984, the total number of patients who experienced a first stroke was 1,028, and the average annual incidence rate per one thousand persons in the population aged 30 or more was 4.46 (5.14 for men and 3.85 for women). The disease took the form of cerebral hemorrhage in an average annual incidence of 1.05, of cerebral infarction in 2.59, and of subarachnoid hemorrhage in 0.20.

The 8-year period of observation was divided into four 2-year periods for the purposes of the study. Changes in the rate of the incidence of first strokes were exmined over the years. When the incidence of stroke was adjusted age to average study population, we found a tendency in both men and women for the incidence of all strokes, cerebral hemorrhage and cerebral infarction to decrease over the years. In men, there was a slight tendency for the incidence of subarachnoid hemorrhage to increase.

In 1985, the course of the disease for patients who experienced a first stroke in the years 1977-1982 was investigated. The one-week survival rate was 84.1%, the one-month rate, 75.5%, the one-year rate, 58.0% the five-year rate, 35.7%, and the nine-year rate, 26.2%.

INTRODUCION

The incidence and rate of death from cerebrovascular diseases (stroke) in Japan is greater than that in any Western country (1,2). Many reports have shown that the incidence and rate of death from stroke has been on the decrease for some decades (3,4). In Japan as well, with the Westernization of living patterns, the result of the popularization of group health examinations that uncover circulatory disorders has been to increase the numbers of patients who are being treated for hypertension. This has contributed to a decline in the numbers of deaths

from stroke since 1966, and particularly since 1971 (5). Stroke was the number-one cause of death in Japan from 1951 to 1980, but in 1981 it was replaced by malignant neoplasms, and at present, it is third after heart diseases. However, even now, stroke accounts for about one-sixth of all deaths in Japan, and since it often causes sever disability in patients who survive, countermeasures to stroke in Japan are still an important problem.

To evaluate the results of locally established countermeasures to stroke, accurate data about this disorder is essential. Advances in the treatment have now increased the survival rate of this disease, and the analysis of the death statistics alone will not accurately reflect the inciednce of this disease.

The Oyabe Health Center in Toyama Prefecture has kept a register of the patients with stroke within the boundaries of its district since 1966. For this study, we used this commumity-based register to investigate the incidence of stroke, changes in the incidence and rates of survival after stroke.

SUBJECTS AND METHODS

Our subjects were all persons living within the district of the Oyabe Health Center who suffered a stroke in the 8-year period from 1977 to 1984.

The district of the Oyabe Health Center is in the Western part of Toyama Prefecture and it comprises Oyabe City and Fukuoka Town, region has the area of 191km^2 (Fig. 1). One part consists of a business district and a residental district, but most of the area is farming land, with rice as the main crop. The average population for the entire period of study is shown in Table 1. The avarage total population was 48,606 persons, and the age group of special interest, persons aged 30 or above, was a average of 28,816 persons (men, 13,613 ; women, 15,203).

Case detection was performed by notification system in a community. Most patients were reported by the physician who diagnosed the condition, but information was also provided to the center by public health nurses, local women's associations, and groups for the support of patients with stroke. To help ensure the completeness of the register, we also checked death certificates, social insurance records, and registers of calls for ambulance service. Immediately after a patient was registered, a public health nurse from the Health Center visited the patient, and investigated the present condition of the patient and the circumstances of the time of onset in an interview.

The diagnosis of stroke and of the type that the disorder took was made with reference to the diagnosis of the physician who reported the case and was also based on all other information available. The diagnosis of stroke was based on the WHO definition (6). The classification of the type of stroke was done according to the criteria of Millican (7).

RESULTS

(1) Numbers of patients with stroke and average annual incidence rate

The total number of patients with a first stroke between the years of 1977 and 1984 recorded in the register system was 1,028 (560 men and 468 women). Table 2 shows, the sex, age and

incidence of strokes for the different clinical type of the disorder. In the 8-year period, the average annual incidence of first episodes of strokes for every 1,000 persons in the population aged 30 or older was 4.46 (5.14 for men ; 3.85 for women). The rate of incidence increased as ages increased in both sexes. Men had a higher incidence rate than women, this difference was greatest in the group aged 40-49, when it was three times that of women. However, this rate of difference in the incidence lessened with increasing age.

Of all strokes, 23.6% involved cerebral hemorrhage, 58.0% involved cerebral infarction, 4.4% involved subarachnoid hemorrhage, and the remaining 14.0% could not be classified. The incidence rate for the different type was as follows for 1,000 persons of the population aged 30 or more ; the average annual incidence rate was 1.05 for cerebral hemorrhage, 2.59 for cerebral infarction, and 0.20 for subarachnoid hemorrhage. For both cerebral infarction and cerebral hemorrhage, the incidence rate increased with age for both men and women.

(2) Changes in the incidence rate of stroke.

The 8-year period of observation was divided into four periods of two years each, and we calculated the age-adjusted two-year average annual incidence rates (Fig. 2). The average rate of incidence of all strokes in women in 1977-78 was slightly lower than that for all strokes in women in 1979-80 ; with this exception, the two-year incidence of all strokes for men and women tended to decrease as time passed. The difference in the first two-year period from 1977-1978 and the last two-year period, 1983-1984, was a decrease by 30% in men and a decrease by 37% in women. The change in the annual average rate of incidence of cerebral infarction showed the same tendency to decrease as did the change for all strokes. For cerebral hemorrhage, the average two-year incidence for both men and women in the most recent two periods 1981-1984, was lower than in the first two periods, 1977-1980. For subarachnoid hemorrhage, the two-year incidence in women tended to decrease, but there was a tendency to increse in men. The results for when the 8-year observation period was divided into two parts (the first four years and the last four years) are shown in Fig. 3, with the rate of incidence shown for different ages. For all strokes, there were increases compared to the first four years only in women aged 30-39 and 40-49, for men and women, all other incidence rates at different ages decreased as time passed, and this tendency was particularly pronounced in the older age groups. Changes in the rate of incidence of cerebral hemorrhage and cerebral infarction for different ages also showed the same tendency.

(3) Survival rate of patients who suffered a first stroke

The 812 patients who suffered a first stroke in the 6-year period from 1977 to 1982 were investigated up to the end of 1985, and their rate of survival was calculated by the life-table method. During this observation period, 565 patients (69.6%) died, and six patients dropped out because they moved elsewhere. For all strokes, the one-week survival rate was 84.1%, that for one month was 75.5%, that for six months was 63.1%, that for one year was 58.0%, that for three years was 43.4%, that for five years was 35.7%, and that for nine years was 26.2%. The survival rates by sex and by age are shown in Fig. 4. As expected, the rate of survival for elderly patients was lower than for younger patients. Women had a lower rate of survival

than men. The survival rates adjusted age are shown by the type of the disorder in Fig. 5. The survival rate for cerebral hemorrhage was low starting immediately after onset. More than half of the patients with cerebral hemorrhage died within the first half year. The survival rate for cerebral infarction was higher than that for cerebral hemorrhage. More than half of the patients with cerebral infarction survived for three years or more after onset.

DISCUSSION

The study reported here made use of the register system for stroke of the Oyabe Health Center to investigate the rate of incidence of a first stroke in the 8-year period from 1977 to 1984. In such a study of a register of patients with stroke the most important thing is that all patients be included. At the Oyabe Health Center, the system of registration of patients with stroke has been in operation for 20 years, and has been improved. At present the physician is usually the one to report a case of stroke, such reports count for more than 80% of the total. In 1977, a register of deaths from this disease was started, based on infarmation obtained from death certificates. Thus, all patients with stroke are now covered by this system. To make additional checks on the register system, cooperation was obtained from local women's organization and groups for the support of patients with stroke in 1977 and 1980. Now, the register system is almost perfect, as of March 1985, of the 577 patients with stroke within the district of the Oyabe Health Center, 542 patients (94%) were registered by this register system. Of the remaining 6%, who were discovered with reference to death certificates, most had died within the first week after onset. Recently, records of requests for ambulance service have also become available, and it has become possible to register even those deaths that occur soon after the first stroke.

The rates of incidence for men in Oyabe are compared with the rate for Sweden (8), New Zealand (9), and the United States (10) in Fig. 6a. For Oyabe and Sweden (in a 1981 study) the rates were about the same, and these rates were somewhat higher than for the two other countries, the United States in a study of 1975 and 1976, and New Zealand in a 1981 study. The rate for women for Sweden and Japan was high for the older age groups (Fig. 6b). Japan has a relatively high incidence of stroke. Research done on the registering of cases of stroke by WHO showed that the rates in Japan and Finland were the highest in the world (1).

By type of the disease, the stroke involved cerebral hemorrhage in 23.6%, cerebral infarction in 58.0%, subarachnoid hemorrhage in 4.4%, and unclassified disorders in 14.0% of the patients in Oyabe. In the U.S.National Survey of Stroke (10), these figures were 6.3% with cerebral hemorrhage, 5.9% with subarachnoid hemorrhage, and 87.8% for cerebral infarction and other forms of the disease. Up until now, the statistics on deaths in Japan showed that cerebral hemorrhage is extremely common in Japan, so Western researchers have questioned the mothods of diagnosis of stroke in Japan ; some writers have suggested that the reverse in the relative proportion of cerebral hemorrhage and cerebral infarction seen in Japan since 1975 has resulted from a change in the habits of diagnosis of Japanese general practioners (11). However, in Oyabe, CT Scans were introduced into this area, in the second half of this 8-year period, but

even with this diagnostic aid, the rate for cerebral hemorrhage in the first 4 years was 24.6% and that in the second 4 years was 22.4%, which was roughtly the same. Tanaka et al. (12) have also reported that clinical diagnoses and the results of diagnosis with the help of CT are almost the same, so the high rate of cerebral hemorrhage in Japan is not a mistake in diagnosis.

The tendency in Japan for the rate of deaths caused by stroke to decrease is being seen in many other countries (2), this trend appeared in Japan in 1966 (5). In the community-based study of Rochester, N.Y, over 35 years (3), it is reported that there has been a decrease in the incidence of stroke in women since 1955 and in men since 1970. Espoo-Kauniainnen reports (4) that for Finland as well, comparison of the rates in 1972-1973 and for 1978-1980 show a tendency to decrease, and that cerebral hemorrhage has decreased most strongly. In the district of the Oyabe Health Center as well, the rates of incidence of cerebral hemorrhage and cerebral infarction in the most recent two years (1983-1984) are 30-40% less than the rates in the first two years (1977-1978). This decrease in the incidence of stroke strongly affect the death rate from stroke. The decline in the incidence of stroke is probably due to the wider use of treatment for hypertension. In the district of the Oyabe Health Center, an overall decline in the rate of incidence was found, with the only tendency to increase being in subarachnoid hemorrhage in men. The average incidence in the years 1983-1984 of this disorder in men was about 2.2 times that in 1977-1978.

Both the age at onset and the kind of the disorder strongly affect the prognosis. In the U. S.National Survey of Stroke (13), the rates of survival were reported to be 70% at one month, 57% at six months, 52% at one year, and 30% at five years. This rates were lower than those in Oyabe. In the U.S.National Survey of Stroke, the data was collected from hospitals, so patients with relatively mild symptoms who were treated at home were ommitted, and thus the reported survival rate is probably lower than the actual rate.

REFERENCE

1. Aho, K. et al. : Cerebrovascular disease in the community : results of a WHO collaborative Study, Bulletin of W.H.O., 58 : 113-130(1980)
2. Kurtzke, J.F. : Stroke, Geographical Variation, In Rose, F.C. ed, Stroke, Epidemiological, Therapeutic and Socio-economic Aspects, Royal Society of Medicine, London, 11-24(1986)
3. Whisnant, J.P. : The Decline of Stroke, Stroke 15 : 160-168(1984)
4. Kotila, M. : Declining incidence and Mortality of Stroke?, Stroke 15 : 255-259(1984)
5. Tanak, H. et al. : Secular Trends in Mortality for Cerebrovascular Disease in Japan, 1960 to 1979, Stroke 13 : 574-581(1982)
6. Hatano, S. : WHO stroke control programme, WHO Chronicle 26 : 456-458(1972)
7. Ad hoc comittee established by Advisory Council for National Institute of Neurological Diseases and Blindness, Public Health Service : A classification and outline of Cerebrovascular diseases. Neurology (Minneap) 8 : 395-434(1958)
8. Alfredsson, L. et al. : Mortality from and incidence of stroke in Stockholm, Brit. Med. J. 292 : 1299-1303(1986)

9. Bonita, R. et al. : Event, Incidence and Fatality Rates of Cerebrovascular Disease in Auckland, New Zealand, Am. J. Epidemiol. 120 : 236-243(1984)
10. Robins, M. et al. : Incidence, In Weinfeld, F.D. ed, The National Survey of Stroke, Stroke 12 (Supplement) : 45-55(1981)
11. Goldberg, I.D.et al : Mortality in 33 countries from disease of nervous system. World Neurology 3 : 444-465(1962)
12. Tanaka, H. et al. : Incidence of Stroke in Shibata, Japan : 1976-1978, Stroke 12 : 460-466 (1981)
13. Baum, H.M. et al. : Survival and Prevalence, In Weinfeld, F,D. ed, The National Survey of Stroke, Stroke 12 (Supplement) : 59-68(1981)

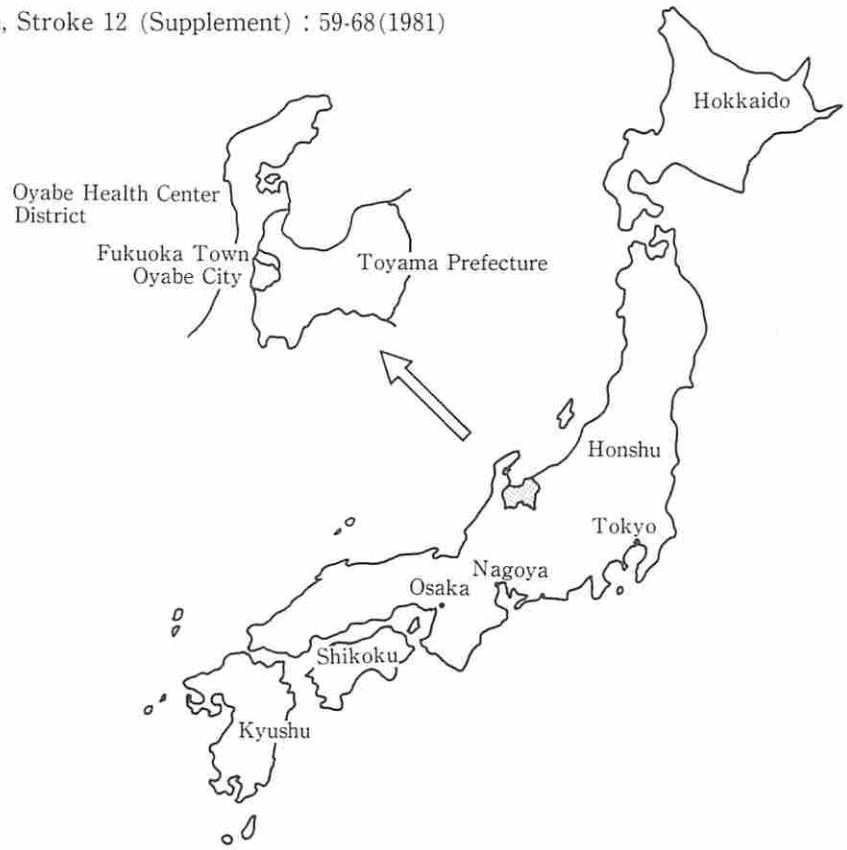

Fig. 1 Study Area and Its Location in Japan

Table 1 Average Population by Age and Sex in Oyabe Health Center District, Japan. 1977—1984

Sex	Age group							Population aged 30+	Total population
	—20	30—39	40—49	50—59	60—69	70—79	80—		
Men	9989	3791	3132	2996	2143	1232	319	13613	23601
Woman	9801	3573	3426	3395	2562	1647	600	15203	25004
Total	19790	7364	6558	6391	4705	2879	919	28816	48606

Table 2 The Number of Cases and Average Annual Incidence Rates per 1,000 Population for All First Episodes of Stroke in Oyabe Health Center District, Japan, 1977—1984

Sex	Subtype	Total	Age groups					
			30—39	40—49	50—59	60—69	70—79	80—
All patients	All strokes	1028(4.46)*	11(0.19)	52(0.99)	127(2.48)	255(6.78)	372(16.15)	214(29.11)
	Cerebral hemorrhage	243(1.05)*	4(0.07)	15(0.29)	34(0.66)	75(1.99)	71(3.08)	44(5.98)
	Cerebral infarction	596(2.59)*	3(0.05)	26(0.50)	66(1.29)	141(3.75)	227(9.86)	135(18.36)
	Subarachnoid hemorrhage	45(0.20)*	3(0.05)	8(0.15)	12(0.23)	9(0.24)	11(0.48)	2(0.27)
	Stroke of undetermined type	144(0.62)*	1(0.02)	3(0.06)	15(0.29)	30(0.80)	63(2.74)	33(4.49)
Men	All strokes	560(5.14)*	6(0.20)	38(1.52)	89(3.71)	155(9.04)	186(18.88)	82(34.05)
	Cerebral hemorrhage	134(1.23)*	1(0.03)	13(0.52)	25(1.04)	40(2.33)	35(3.55)	20(7.83)
	Cerebral infarction	333(3.06)*	2(0.07)	17(0.68)	48(2.00)	93(5.43)	122(12.38)	52(20.35)
	Subarachnoid hemorrhage	21(0.19)*	3(0.10)	5(0.29)	7(0.29)	5(0.29)	1(0.10)	0(—)
	Stroke of undetermined type	72(0.66)*	0(—)	3(0.12)	9(0.38)	17(0.99)	28(2.84)	15(5.87)
Women	All strokes	468(3.85)*	5(0.17)	14(0.51)	38(1.40)	100(4.88)	186(14.12)	127(26.47)
	Cerebral hemorrhage	109(0.90)*	3(0.10)	2(0.07)	9(0.33)	35(1.71)	36(2.73)	24(5.00)
	Cerebral infarction	263(2.16)*	1(0.03)	9(0.33)	18(0.66)	48(2.34)	105(7.97)	83(17.30)
	Subarachnoid hemorrhage	24(0.20)*	0(—)	3(0.11)	5(0.18)	4(0.20)	10(0.76)	2(0.42)
	Stroke of undetermined type	72(0.59)*	1(0.03)	0(—)	6(0.22)	13(0.63)	35(2.66)	18(3.75)

* figures in bracket are incidence rates per 1,000 population
a per 1,000 population aged 30 and over

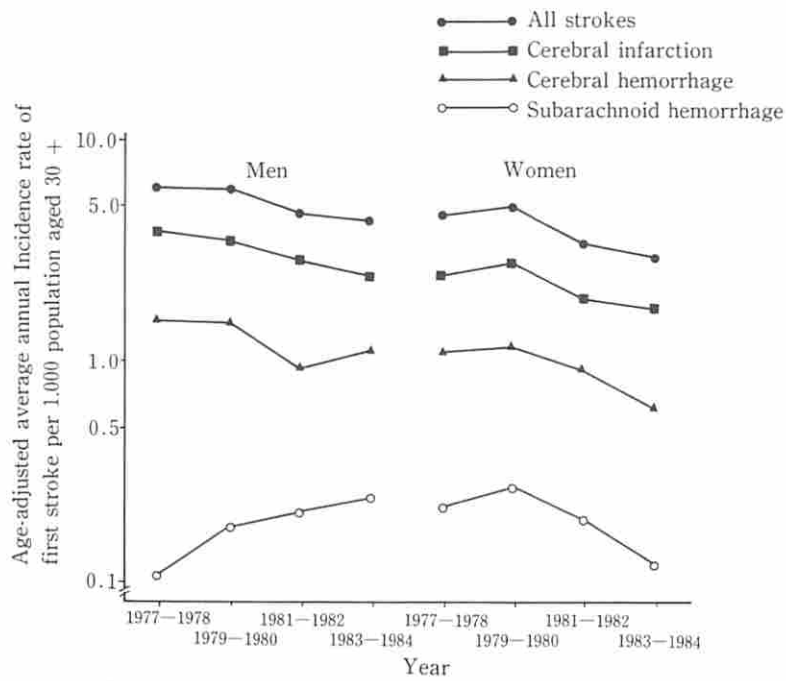

Fig. 2 Two-year Average Annual Incidence Rates per 1.000 Population for All First Episodes of Stroke in Men and Women in Oyabe Health Center Distsict. Japan, Age Adijusted to Average Study Population by Sex. 1977—1984

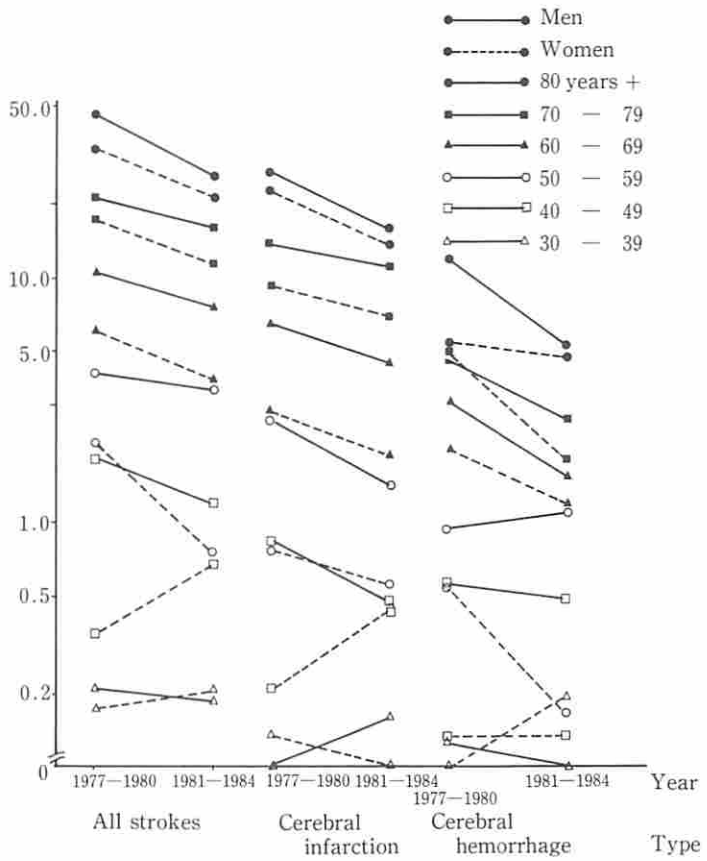

Fig. 3 4-year Average Annual Incidence Rates per 1.000 Population for All First Episode of Stroke by Sex and Age in Oyabe Health Center District, Japan

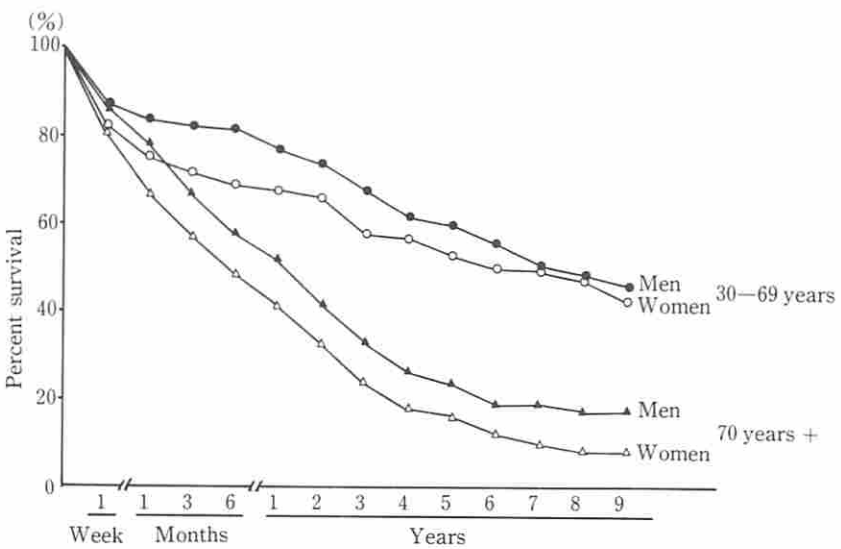

Fig. 4 Probability of Survival agter First Stroke by Sex and Age.

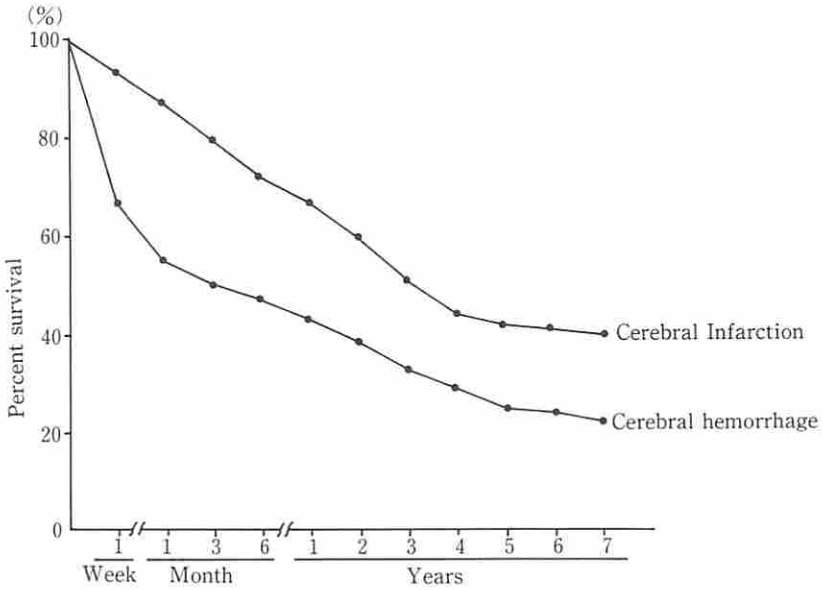

Fig. 5 Age-adjusted Survival after First Stroke by Clinical Type.

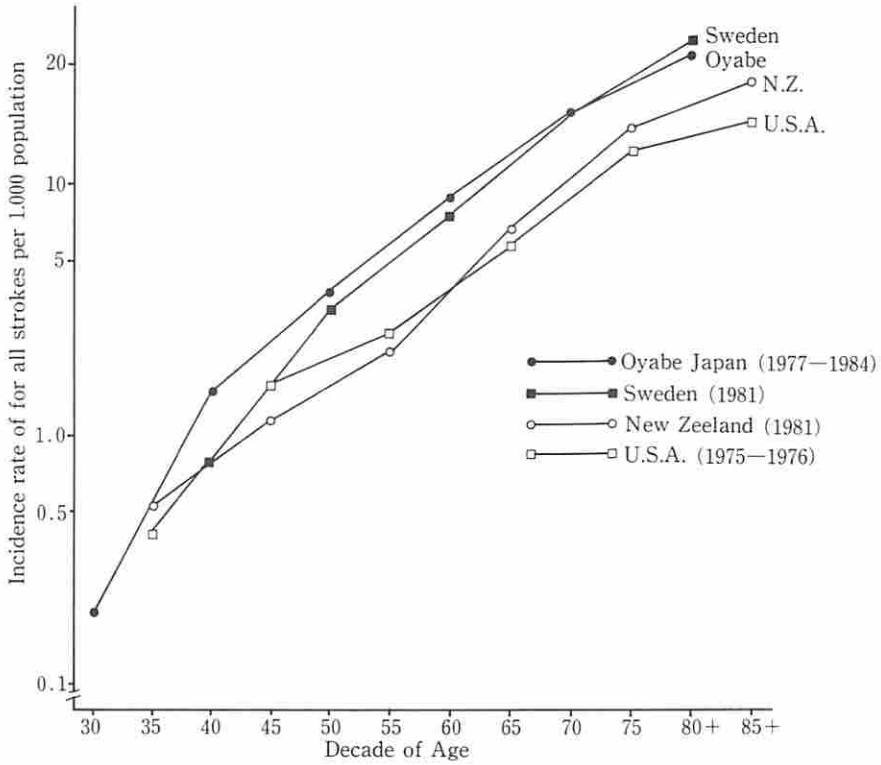

Fig. 6a Comparison of incidence Rate per 1.000 Population for First Stroke in Oyabe with in 3Countries (Sweden, New Zeeland, U.S.A.), Men

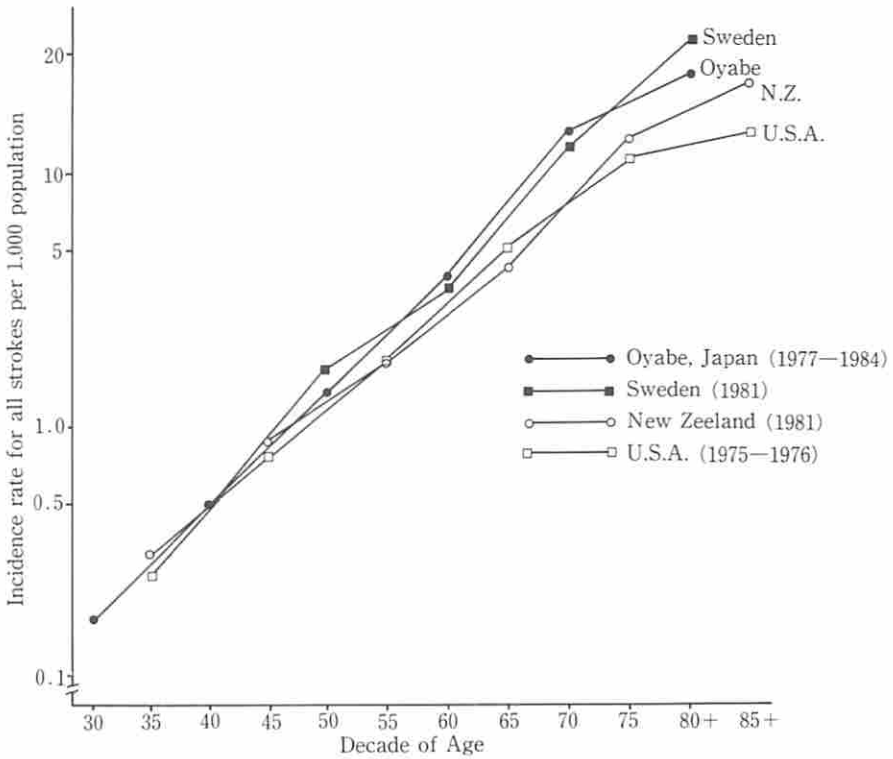

Fig. 6b Comparison of Incidence Rate per 1.000 Population for First Stroke in Oyabe with in 3Countries. (Sweden, New Zeeland, U.S.A.), Women