Prevalence of Parkinson’s Disease in Hokkaido, the Northernmost Island of Japan

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The prevalence of Parkinson’s disease (PD) was investigated in Hokkaido, the northernmost island of Japan. A pilot case-finding study was carried out to estimate the prevalence in the entire island of Hokkaido (population = 5,643,647) initially, then we surveyed the prevalence at one of the smaller cities, Iwamizawa City (population = 80,417). We ascertained 5,342 cases with PD in Hokkaido and 77 cases in Iwamizawa City, estimating the crude prevalence of 94.7/100,000 in Hokkaido (June 30, 1993) and 95.8/100,000 in Iwamizawa City (April 1, 1994), respectively. We calculated that the crude prevalence rate of PD in Japan is currently close to 100/100,000, but the age-adjusted prevalence is still low, compared with those in Europe and North America. (Internal Medicine 35: 276-279, 1996)

Key words: crude prevalence rate, age-adjusted prevalence, longevity, environment, race

Introduction

Parkinson’s disease (PD) is one of the most common neurological diseases throughout the world. Many epidemiologic surveys in different races and parts of the world have been conducted and have raised several controversial points (1, 2). Higher prevalence rates of PD in Europe and North America, in contrast with lower rates in Japan, China and Africa have been reported (1–3).

In Japan, 50 to 80 per 100,000 population has been accepted as the prevalence rate of PD up to now (4–6). With the substantial increase in the longevity of the Japanese community, it will be necessary to obtain the current prevalence rates of PD as it is an age-associated disease.

To clarify the latest prevalence of PD in a part of Japan, we carried out epidemiologic studies in Hokkaido, the northernmost island of Japan.

Patients and Methods

Background

Hokkaido, the second largest and northernmost island of Japan, is located at latitude between 42 and 46 degrees north, with an area of 83,500 km². Historically, this island was reclaimed about 130 years ago by immigrants from the rest of Japan. The population has been stable at about 5.6 million for the last 10 years (5,643,647 in the 1990 census of population).

Iwamizawa City is located about 40 km north of Sapporo, the capital city of Hokkaido, and is mainly an agricultural city. The population was 80,417 in the 1990 population census which has been quite stable for the last 10 years. The percentage of those aged over 65 years in this city is 12.8%, which is about the same as that of entire Japan (12.1%). As for the epidemiologic studies, the survey of motor neuron disease and past poliomyelitis was carried out in collaboration with all of the neurologists in this area (7).

Case selection and data collection

We adopted the same method used in the study of motor neuron disease to investigate the prevalence of PD in Hokkaido. Three sources were used to collect cases with PD: 1) neurologists practicing in this area, 2) inquiries sent to 622 major general hospitals, and 3) the notification file of PD provided by the Japanese Ministry of Welfare and Health. This notification included the cases with PD of Hoehn and Yahr stage III, or higher.

We collected cases with PD from October 1, 1992 to May 1, 1993. From the Department of Neurology, Hokkaido University School of Medicine, Sapporo, *the Department of Neurology, Bibai Rosai Hospital, Bibai, **Hokuyukai Neurological Hospital, Sapporo, the Departments of ***Neurosurgery and ****Neurology and Psychiatry, Iwamizawa Municipal General Hospital, Iwamizawa

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1994. Two-phase surveys were performed: 1) a pilot case-finding study was performed to obtain the approximate prevalence of PD in the entire island of Hokkaido on the prevalence day (June 30, 1993), and subsequently 2) the prevalence in Iwamizawa City was estimated on April 1, 1994. In the survey of Iwamizawa City, only cases with PD diagnosed by board-certified neurologists, or medical records reviewed by us were ascertained.

Identification of PD cases required fulfillment of the following: 1) existence of at least two or more cardinal signs of PD, such as resting tremor, bradykinesia, rigidity and loss of postural reflexes, 2) no abnormality being detected on brain CT, and 3) good response to treatment by anti-Parkinsonian drugs. We excluded cases of Parkinsonism, such as multiple lacunar state, normal pressure hydrocephalus, CO intoxication, brain tumor, and degenerative disorders like multiple system atrophy, or progressive supranuclear palsy.

We calculated the crude prevalence rate of PD for both sexes in the entire island of Hokkaido and Iwamizawa City on each prevalence day. The age-sex specific rates in Iwamizawa City were estimated for men and women for every 5-year range separately, and the age-adjusted rates using the 1970 US total population as the standard were obtained to compare with the worldwide rates of PD.

Results

The crude prevalence of PD in the entire Hokkaido

For the period from October 1992 to June 1993, a total of 5,342 cases with PD were identified, in which 2,598 cases were diagnosed by neurologists, 2,112 cases from major hospitals (306 replies to inquiries, 47.3%), and 2,326 cases found in the notification files fulfilled the criteria and we excluded overlapping 1,694 cases.

The crude prevalence of PD was estimated as 94.7 per 100,000 population in Hokkaido on June 30, 1993.

Prevalence of PD in Iwamizawa City, Hokkaido

A total of 77 cases with PD were identified in Iwamizawa City between October 1992 and May 1994. Eighteen cases from major hospitals, 52 cases in the notification files and 68 cases from neurologists were collected. Of these, 61 cases, overlapped and one case each were excluded. We also excluded 2 cases who died during the survey period and 22 cases with Parkinsonism, not idiopathic PD. Out of total 77 identified cases, 68 were confirmed by board-certified neurologists and the remaining 9 were ascertained by contacting with their primary doctors and reviewing medical records. Seven cases, 3 men and 4 women, were newly diagnosed to have PD between 1993 and 1994.

The crude prevalence was estimated as 95.8/100,000 on April 1, 1994, and the annual incidence was 8.7/100,000 in 1993.

Age-sex specific prevalence rate in Iwamizawa City

The age- and sex-specific prevalence for women was 99.8 per 100,000 population [95% confidence interval (CI), 69.8–130.0], which is higher than the 91.3/100,000 (95% CI, 61.1–121.5) for men as shown on Table 1.

The age-adjusted prevalence to the 1970 US total population was 71.2/100,000: 63.2/100,000 for men and 77.8/100,000 for women.

| Table 1. Age-Specific Prevalence of Parkinson’s Disease in Iwamizawa City, Hokkaido, Japan |
|----------------------------------|--|--|
| Age (yr) | Population | Cases | Rate | Population | Cases | Rate | Population | Cases | Rate |
| 40-44   | 7,118     | 1    | 14.0 | 3,401     | 0    | 0    | 3,717     | 1    | 26.9 |
| 45-49   | 5,732     | 1    | 17.4 | 2,706     | 1    | 37.0 | 3,026     | 0    | 0    |
| 50-54   | 5,496     | 2    | 36.4 | 2,525     | 0    | 0    | 2,971     | 2    | 67.3 |
| 55-59   | 5,788     | 7    | 120.9| 2,735     | 4    | 146.3| 3,053     | 3    | 98.3 |
| 60-64   | 5,176     | 10   | 193.2| 2,529     | 5    | 197.7| 2,647     | 5    | 188.9|
| 65-69   | 3,921     | 12   | 306.0| 1,762     | 6    | 340.5| 2,159     | 6    | 277.9|
| 70-74   | 2,786     | 23   | 825.6| 1,263     | 11   | 870.9| 1,523     | 12   | 788.0|
| 75-79   | 1,960     | 15   | 765.3| 856       | 8    | 934.6| 1,104     | 7    | 634.1|
| 80-84   | 1,109     | 6    | 541.0| 402       | 0    | 0    | 707       | 6    | 848.7|
| 85+     | 565       | 0    | 0.0  | 189       | 0    | 0    | 376       | 0    | 0    |
| Crude   | 80,417    | 77   | 95.8 | 38,351    | 35   | 91.3 | 42,066    | 42   | 99.8 |
| (95% CI)| (74.4–117.2) | | | (61.1–121.5) | | | (69.8–130.0) | | |
| Age-adjusted | 71.2 | 63.2 | 77.8 |
| (95% CI)| (52.8–89.6) | | | (50.4–88.4) | | | (51.2–104.4) | | |

Rate: rate per 100,000 population based on the 1990 census of population, Crude: crude prevalence, 95% CI: 95% confidence intervals, Age-adjusted: age-adjusted prevalence to the 1970 US total population.
performed in the past (6, 8-11). Among them, the recent and this community. The crude prevalence was 95.8/100,000 in Japan. Further, neurologists could perform all of the surveys in the same ratio of the aged in the community as that of overall for an epidemiologic study because of its stable population, and as the study site; it is a typical rural countryside city and suitable in Izumo City, 66 cases with PD were identified by door-to-door survey, yielding 82.0/100,000 as the crude prevalence in 1980 (6). In Izumo City, 66 cases with PD were identified by door-to-door survey, yielding 82.0/100,000 as the crude prevalence which may be over 100/100,000 for the population. Of case ascertainment are necessary including a door-to-door survey in Hokkaido, might provide a more appropriate prevalence rate which may be over 100/100,000 for the population.

### Discussion

In Japan, several epidemiologic studies of PD have been performed in the past (6, 8-11). Among them, the recent and representative surveys are those carried out in Yonago City (Tottori Prefecture) and Izumo City (Shimane Prefecture) (6, 11). In Yonago City, Harada et al found 101 cases of PD among 125,291 residents for the period of 1975–1981 in a hospital-based study, estimating the crude prevalence to be 80.6/100,000 in 1980 (6). In Izumo City, 66 cases with PD were identified by door-to-door survey, yielding 82.0/100,000 as the crude prevalence in 1985 (11). Recently, another study was carried out in Yonago City, the western part of Japan, and 129 cases with PD were ascertained; the crude prevalence in 1992 was reported as 80.6/100,000 (Tottori Prefecture) and Izumo City (Shimane Prefecture) (6, 11). In Yonago City, Harada et al found 101 cases of PD among 125,291 residents for the period of 1975–1981 in a hospital-based study, estimating the crude prevalence to be 80.6/100,000 in 1980 (6). In Izumo City, 66 cases with PD were identified by door-to-door survey, yielding 82.0/100,000 as the crude prevalence in 1985 (11). Recently, another study was carried out in Yonago City, the western part of Japan, and 129 cases with PD were ascertained; the crude prevalence in 1992 was reported as 97.5/100,000 (12).

In our preliminary study, which included 5,342 cases in Hokkaido, we estimated the crude prevalence to be 94.7/100,000 in 1993. A more detailed survey in the entire Hokkaido is difficult as the population is large and due to the involvement of non-neurologists. Subsequently, we chose Iwamizawa City as the study site; it is a typical rural countryside city and suitable for an epidemiologic study because of its stable population, and the same ratio of the aged in the community as that of overall Japan. Further, neurologists could perform all of the surveys in this community. The crude prevalence was 95.8/100,000 in 1994. From these prevalence rates recently estimated in different areas, in western and northern Japan, the crude prevalence of PD is currently close to 100/100,000 in Japan.

To compare with the worldwide prevalence of PD, we calculated the age-adjusted rate to the total population of US in 1970. The age-adjusted rates per 100,000 were 73 in Yonago City, 61 in Izumo City and 71 in Iwamizawa City. These age-adjusted rates are lower than the worldwide average rate of 103, ranging from 56 to 194 in Europe and North America (3, 13, 14) (Table 2). The reason as to why Japanese prevalence rates of PD are still lower is a matter of controversy. Some investigators are of the opinion that racial and environmental factors might play important roles in the development of PD, while others attribute the difference to the different methods of survey. Further studies of case ascertainment are necessary including a door-to-door survey in Hokkaido, might provide a more appropriate prevalence rate which may be over 100/100,000 for the population.

### References

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