

PREVALENCE OF POST-POLIO SYNDROME BASED ON A CROSS-SECTIONAL SURVEY IN KITAKYUSHU, JAPAN

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Objectives: To determine the number of polio survivors living in Kitakyushu, Japan, and the prevalence of post-polio syndrome.

Design: Cross-sectional survey in Kitakyushu.

Subjects/Patients: A total of 342 possible polio survivors were selected from the list of physically disabled persons' certificates administered by the Department of Health and Welfare, Kitakyushu City Government.

Methods: A self-administered questionnaire concerning the diagnosis, paralysis, limitation in daily living, and use of adaptive devices was mailed to the 342 possible polio survivors.

Results: By confirmation of the diagnosis, 241 of the 342 turned out to be polio survivors, and the number of polio survivors per population of 100,000 amounted to 24.1. Of the polio survivors, 85% complained of new health problems such as difficulty in climbing stairs, muscle weakness, difficulty in walking, or fatigue. According to Halstead's criteria, 180 polio survivors suffered from post-polio syndrome, and the prevalence of post-polio syndrome in Kitakyushu was 18.0 per population of 100,000.

Conclusions: This survey revealed the number of polio survivors, and the prevalence of post-polio syndrome in Kitakyushu, Japan.

Key words: polio survivor, post-polio syndrome, prevalence, disability.

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INTRODUCTION

The epidemics of poliomyelitis in the 1940s and 1950s left more than 250,000 survivors in the USA with residual weakness (1). Subsequently, polio survivors complained of new muscle weakness, fatigue, pain and other symptoms, which were reported as progressive postpoliomyelitis muscular atrophy (2), post-poliomyelitis progressive muscular atrophy (3), the late effects of polio, post-polio syndrome (PPS) (4) or others.

Children in Japan were confronted with epidemics during

1949–51 and 1958–60 and more than 37,000 children contracted poliomyelitis (5). Although poliomyelitis has already become extremely rare in Japan since the introduction of the oral live vaccine in 1961, polio survivors whose neuromuscular symptoms had been stable for 3 or more decades now complain of new symptoms and functional decline. These new health problems are considered as PPS. In recent years, PPS has turned into a grave issue for Japanese polio survivors, and it appears that Japan is following the USA, but is approximately 10 years behind. Several epidemiological surveys on neuromuscular, physical and psychosocial problems have been reported (6–8), but few nationwide studies on polio survivors suffering from PPS and their symptoms have been carried out in Japan (9, 10). From the perspective of rehabilitation medicine and social welfare, it is important to determine the number of polio survivors suffering from PPS in Japan, what the new health problems are and the best methods of preventing and treating PPS. The few studies in Japan were based on arbitrarily selected polio survivors and until now it has been unknown how many polio survivors with PPS there are in our community. At the beginning of a nationwide survey of PPS, therefore, a cross-sectional survey of PPS was performed to obtain the true number of polio survivors in Kitakyushu, Japan and the prevalence of PPS.

METHODS

A total of 342 possible polio survivors living in Kitakyushu City (population 1,001,000) were selected with the approval of the Welfare Center for the Disabled, Kitakyushu City, from the list of 13,000 physically disabled persons' certificates registered by the Department of Health and Welfare, City Government. According to the law for the Welfare of Physically Disabled Persons, medical specialists at the Department have to officially acknowledge and assess all disabled persons living in Kitakyushu, and the City Government delivers socio-economic support based on the degree of invalidity. Although the Department has sufficient administration for the physically disabled persons' certificates, the terms for poliomyelitis appearing in the certificates have varied a little over the last 40 years. A disabled person described by 1 of the following terms – polio, poliomyelitis, spinal infantile paralysis, infantile paralysis or flaccid paralysis – was considered as a possible polio survivor.

A questionnaire was mailed to the 342 possible polio survivors, inquiring about the diagnosis (poliomyelitis or not), profile (present age, age at onset, gender), paralysis, limitation in daily living, and use of assistive devices (orthosis, cane, [electric] wheelchair, and others). Forty-five did not agree to respond, 40 replied that their disease had not been poliomyelitis, 15 had moved to other cities and 1 had died. As 241 of the 342 agreed to respond and confirmed their diagnosis of

poliomyelitis, the 241 were finally submitted for analyses as polio survivors.

Halstead's criteria were used for the diagnosis of PPS (6), and polio survivors with 2 or more new symptoms of the 8 physical conditions – fatigue, shortness of breath, muscle weakness, difficulty in walking, difficulty in climbing stairs, muscle pain, joint pain and cold intolerance/numbness – were regarded as having PPS.

RESULTS

There were 241 polio survivors in Kitakyushu, and the number of polio survivors per 100,000 population was 24.1. The age of the 241 polio survivors was 56.8 ± 11.2 years (mean \pm standard deviation, range 39–86 years), and the gender division was 142 (58.9%) men and 99 (41.1%) women. The age at onset was 2.3 ± 2.2 years (range 0–22 years).

Of the 241 polio survivors, 64.3% had paralysis of 1 extremity; 30.3%, 2 extremities; 2.5%, 3 extremities; and 2.9%, 4 extremities. In daily living, 49.4% and 41.4% of the 239 polio survivors complained of serious and slight limitation, respectively. Of the 239, 33.6%, 35.3% and 16.4% used an orthosis, cane and wheelchair, respectively. Only 38.7% did not use any assistive devices in daily living.

After a stable period of paralysis, 84.7% noticed 1 or more new symptoms. The symptoms that over 50% of the polio survivors described were difficulty in climbing stairs, muscle weakness, difficulty in walking, and fatigue (Table I). Consequently, 180 polio survivors (76.3%) met Halstead's criteria for PPS, and the prevalence of PPS was 18.0 per 100,000 population.

DISCUSSION

The polio survivors in this survey are living in Kitakyushu, a large city in a rural area. Using the list of physically disabled persons' certificates was the most appropriate method for selecting polio survivors from all persons living in Kitakyushu, because almost all polio survivors have had their disabilities acknowledged by City Government in order to receive medical and social benefits, the list of physically disabled persons' certificates is well preserved, and obligatory duration for preserving medical charts in hospitals is only 5 years. The response rate of polio survivors, which was calculated by dividing the number of polio survivors who responded by the total number of polio survivors living in Kitakyushu, was very high (84.3%). However, this survey has a few limitations: (a) polio survivors without any disability are not included, even if they have slight muscle weakness; (b) the terms for poliomyelitis used in the administrative office have varied a little; (c) a self-administered questionnaire may be less sensitive than a direct interview. The polio survivors who have no paralysis or have slight muscle weakness are not likely to develop PPS. Despite the number of terms for poliomyelitis in the certificates, it was possible to appropriately select polio survivors from the possible polio survivors in the list of physically disabled persons' certificates by confirming the diagnosis. A rough

Table I. *New health problems for polio survivors (n = 236)*

New health problem	n (%)
Difficulty in climbing stairs	135 (57.2)
Muscle weakness	130 (55.1)
Difficulty in walking	123 (52.1)
Fatigue	119 (50.4)
Joint pain	91 (38.6)
Cold intolerance/numbness	61 (25.8)
Muscle pain	58 (24.6)
Shortness of breath	50 (21.2)
None	36 (15.3)

estimate of the number of polio survivors per 100,000 population in Japan is 28.4. This figure was obtained by dividing the difference between the annually reported occurrences of poliomyelitis and deaths from poliomyelitis by the population of Japan (126,920,000) based on the statistics on communicable diseases (5) and vital statistics of Japan (18). Because the number of deaths from other causes can not be excluded from the calculations, the rough estimate of polio survivors may be somewhat overestimated. From the result of the cross-sectional survey, the true number of polio survivors per 100,000 population is 24.1 in Kitakyushu, which is slightly smaller than the rough estimate of polio survivors in Japan. It is, therefore, believed that the cross-sectional survey and the true number of polio survivors are practically accurate, and the prevalence of PPS, i.e. 18.0 per population of 100,000 obtained in the survey, is also reasonable.

New health problems for PPS patients are less frequent in this cross-sectional survey than in other reports, for example, 55.1% for muscle weakness in this survey vs 86.8% in Halstead's report (6). Although the subjects in the survey may include polio survivors with less disability than those in a hospital-based survey, and a self-administered questionnaire may be biased toward a healthy condition, it is noteworthy for Japanese physiatrists that the incidences of new symptoms in PPS patients in the survey are relatively low compared with other reports (6, 8). We should plan direct interviews of polio survivors living in Kitakyushu, in order to reveal whether Japanese polio survivors have low incidences of new symptoms.

In conclusion, this cross-sectional survey of polio survivors and PPS patients living in Kitakyushu, Japan, revealed that the number of polio survivors per 100,000 population is 24.1, and that the prevalence of PPS is 18.0 per 100,000 population. This survey will provide the basis for further epidemiological study in Japan in order to minimize the risk of PPS, and may constitute the beginning of an international comparative study.

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