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SHORT PAPER
Culturally verified *Mycoplasma pneumoniae* pneumonia in Japan: a long-term observation from 1979–99

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SUMMARY

We describe the prevalence of community-acquired *M. pneumoniae* pneumonia diagnosed by culture methods in a single institute in Japan from January 1979 to December 1999. Cultures were performed in 2971 pneumonia cases and yielded *M. Pneumoniae* in 508 cases. The epidemic peaks recurred regularly at 4-year intervals (1980, 84, 88 and 91–2). Although a large epidemic has not occurred since 1992, traces of epidemic periodicity have still persisted from 1992 to 1999 at 3-year intervals.

Mycoplasma pneumoniae is a common cause of pneumonia and other upper and lower respiratory infections in children and young adults. Transmission occurs through the inhalation of respiratory droplets when in close contact with an infected person. We previously determined that the organism caused 5% of hospitalized community-acquired adult pneumonias [1], and as in Western countries, it was one of the important causative agents in Japan. Most of the previous studies on the prevalence of *M. pneumoniae* infections have been based on serological diagnosis [2–4]. To our knowledge, few analyses based on culture methods have been reported. Although long-term studies of the infection in Western populations have indicated an epidemic periodicity of 3–7 years [2–4], some of these studies showed ambiguities in the periodic waves [3, 4].

We performed a culture-based surveillance for *Mycoplasma pneumoniae* pneumonia at Kurashiki Central Hospital from January 1979 to December 1999. Among the patients who visited the department of internal medicine or paediatrics and were diagnosed with community-acquired pneumonia, sputa, throat swabs, or both were obtained and cultured for *M. pneumoniae* and other bacteria when there was a suspicion of *M. pneumoniae* pneumonia. Pneumonia was diagnosed when a patient presented chest roentogenographic infiltrate and had at least one of the following symptoms: fever, cough with or without sputum, and dyspnoea. The *M. pneumoniae* cultures were performed at the Department of Microbiology with PPLO agar and PPLO broth (Difco) according to the standard procedures [5].

From 1979 to 1999, cultures for *M. pneumoniae* performed in 2971 pneumonia cases yielded this organism in 508 cases. During this study, four epidemics of *M. pneumoniae* pneumonia were noted (Fig. 1). The epidemic peaks recurred regularly at 4-year intervals from 1979 through 1992, and the epidemic peak years were distinct (80, 84, 88, 91–2). Since the last epidemic in 1991/2, there has been no large epidemic and differences between the peaks and nadirs have been unclear. However, mild waves of epidemics still seem to persist at 3-year intervals. The disease was prevalent all year round, with a relatively higher incidence in summer and autumn than in winter. It appeared most frequently in August (data

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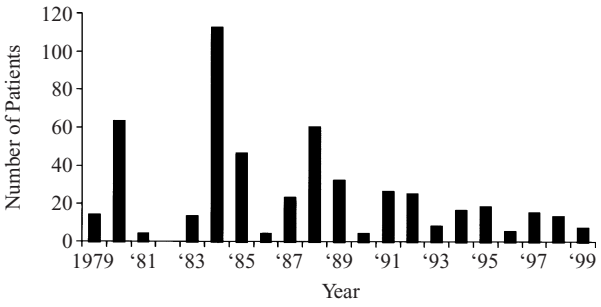

Fig. 1. Annual incidence of *Mycoplasma pneumoniae* pneumonia confirmed by isolation.

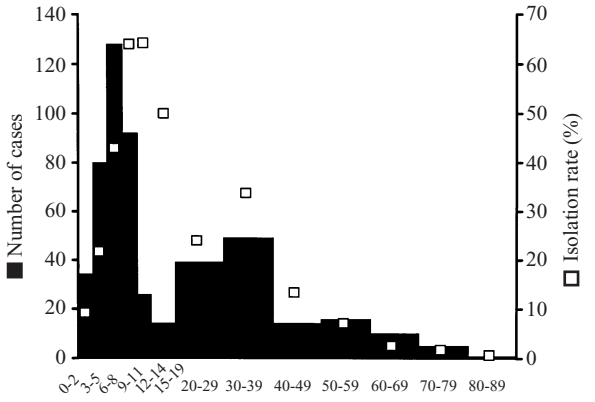

Fig. 2. Age distribution of patients with *Mycoplasma pneumoniae* pneumonia confirmed by isolation.

not shown). Figure 2 shows the age distribution. The mean age was 15·7 years, and the range was from 5 months to 86 years. Seventy-two percent of all the patients were children aged 15 years or younger, and the number of patients peaked at the age of 7. The isolation rate in all tested cases was highest among the early teenager group. The reason for this discrepancy is probably that, compared to infants, teenagers present fewer pneumonias caused by other micro-organisms. One girl manifested culture-positive *M. pneumoniae* pneumonia on two separate occasions at the ages of 6 and 11. Many other organisms of unknown significance, including *Streptococcus pneumoniae* and *Haemophilus influenzae*, were isolated in *M. pneumoniae*-positive cases by routine bacterial culture (data not shown). Mixed infections with *M. pneumoniae* appear to be uncommon but secondary bacterial infections may occur in rare cases [6].

Epidemics of *M. pneumoniae* infections have been reported to occur at intervals of 3–7 years [2–4]. This disease was called the 'Olympic disease' in Japan since the number of reported infections with this organism jumped every year the Olympic Games were held [7–9]. This periodicity stopped after 1992 [7], but our data showed that there may still remain a weak periodicity at 3-year intervals. In Denmark [3], a regular periodicity of epidemics every 4·5 years continued during 1958–74. After two 'premature' epidemics in 1975 and 1977/78, a 9-year hyper-endemic-to-hypoendemic period succeeded. Then epidemics re-emerged in 1987/8 and 1991/2. In Poland [4], epidemics occurred regularly every 5 years during 1970–85. Since the most recent epidemic, which started in 1991 and culminated in 1992–3, there seems to have been a change from epidemic to endemic occurrence of *M. pneumoniae* infections. The epidemic pattern in Japan shares certain similarities with the descriptions in the two populations in that a strict pattern of intervals was interrupted and followed by an apparent change to endemic infection.

Our data on incidence by age was similar to that of Foy. The rates of *M. pneumoniae* pneumonia were highest among children aged 5–9 years and that another peak was seen among adults in their 30s [2]. The incidence of *M. pneumoniae* infections in infants aged below 6 months is very low, probably because of the protective effect of maternal-derived antibodies persisting after birth [10].

We encountered one patient who contracted *M. pneumoniae* pneumonia twice at an interval of 5 years. Foy postulated that the occurrence of reinfection suggested that naturally-acquired immunity to *M. pneumoniae* pneumonia was not durable [11]. He also demonstrated that antibody levels to *M. pneumoniae* fell more abruptly in patients who had mild symptoms than in those who had pneumonia [2]. In Japan, anti-mycoplasmal agents have become widely used in patients with upper or lower respiratory infections to keep their conditions from deteriorating. We conjecture that antibodies lacking in durability have become prevalent in the population resulting in the disappearance of large epidemics since 1992.

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