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An Outbreak of Extended-Spectrum β -Lactamase (ESBL)-Producing *Shigella sonnei* at a Day Care Nursery in Sakai City, 2006

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A small outbreak of *Shigella sonnei* occurred in a day care nursery at the end of October 2006. On October 26, medical institute A in Sakai City reported that a 3-year-old boy had been infected with *S. sonnei*. On October 27, a second case in a 3-year-old boy and a third case in a 4-year-old girl were reported by medical institute B and medical institute C, respectively. It was determined that all three children were attending to the same day care nursery. Further epidemiological investigations were performed at the day care center, including examinations of the health of each child attending the nursery as well as the environmental or hygienic conditions of the nursery between October 13 and 27.

During these investigations, 10 other children demonstrated symptoms of fever and diarrhea. On October 23, 13 nursery children were absent, possibly due to the same symptoms, although details of the transmission route could not be determined. The time course of the outbreak is shown in Fig. 1.

For further bacteriological investigation, a total of 128 stool specimens from 81 people including 29 nursery children, 46 family members of the children and 6 staff members were collected. *S. sonnei* was detected in 10 children and 3 parents. Ten swab specimens from the kitchen of the nursery were negative for the bacterial isolation. All 13 isolates showed typical biochemical properties of *S. sonnei* and were found to be positive for the *invE* and *ipaH* genes by PCR with specific primer sets which were constructed by us and commercialized by Takara Ltd., Otsu, Japan.

The 13 isolates were analyzed by pulsed-field gel electrophoresis (PFGE). The PFGE patterns of 12 isolates were identical to each other. However, one isolate, lane 7, demonstrated some different bands than the others (Fig. 2). The 13 isolates were also tested for their susceptibility to 12 antibiotics using a disk diffusion method. All of these isolates were resistant to 6 antibiotics including ampicillin, streptomycin, tetracycline, trimethoprim-sulfamethoxazole, nalidixic acid and cefotaxime, and were sensitive to 6 antibiotics including kanamycin, gentamicin, ciprofloxacin, chloramphenicol, norfloxacin and fosfomycin. Because the isolates showed cefotaxime-resistant characteristics, it was strongly suggested that the isolates produced extended-spectrum β -lactamases (ESBL) (1). In order to confirm ESBL production, the double-disk synergy test was performed using four disks (cefotaxime, cefotaxime/clavulanic acid, ceftazidime, ceftazidime/clavulanic acid) simultaneously as recommended by the Clinical Labora-

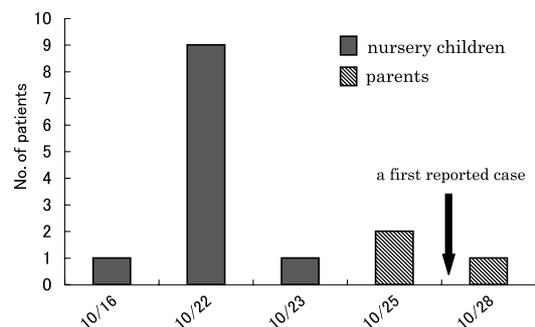


Fig. 1. Time course and the number of infected patients with *S. sonnei*.

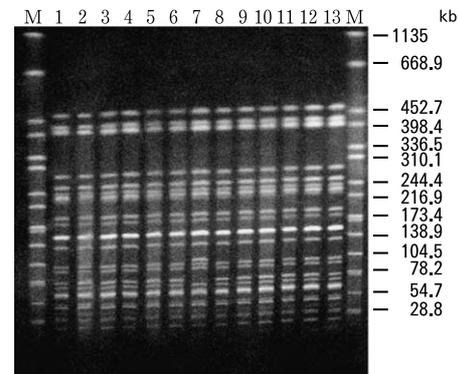


Fig. 2. *XbaI* digested PFGE patterns of *Shigella sonnei* isolates. Lanes 1-13 were isolates from patients and showed almost the same DNA patterns except for the isolate in lane 7 which is different patterns around 104.5 kb and 78.2 kb. M: *Salmonella* Braenderup H9812 strain was used as a control.

tory Standards Institute (CLSI) (2). The zone diameters increased in the presence of clavulanic acid, which suggests a disturbance of the enzyme activity of β -lactamase. As a result, it was verified that the isolates have ESBL production. Our epidemiological investigation determined that none of the parents or staff members had traveled abroad recently. In addition, three parents developed illnesses more than 3 days after the children, which might be due to secondary infections.

One month later, all the children, parents and staff members were re-examined for the presence of *S. sonnei* and all were negative.

Recently, various Gram-negative bacilli such as *Klebsiella pneumoniae* (3) were detected from the clinical specimens that produced ESBL. However, there are few reports con-

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cerning ESBL-producing *S. sonnei* (4,5). Infection by *S. sonnei* is thought to spread easily via a small number of bacteria and to produce extensive secondary infections. The present study showed that an unknown infectious route might be a cause of a diffuse outbreak by ESBL-producing *S. sonnei* in Japan.

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