Jpn. J. Infect. Dis., 60, 2007

Laboratory and Epidemiology Communications

An Outbreak of Nalidixic Acid-Resistant *Salmonella enterica* Serovar Enteritidis at a Nursery School in Kitakyushu City, Japan

Satomi Tokuzaki* and Masaki Takahashi

Kitakyushu City Institute of Environmental Sciences, Kitakyushu 804-0082, Japan

Communicated by Haruo Watanabe

(Accepted December 7, 2006)

On September 2004, an outbreak of gastroenteritis occurred at a nursery school in Kitakyushu City, Japan. The total number of patients was 98; their major symptoms were diarrhea (95 persons) and fever (72 persons). The onset of the symptoms was distributed from September 7 to September 17 (Fig. 1).

Because the lunch served at the nursery school was suspected as the source of infection, 32 stored portions of the lunches that had been served from August 31 to September 10 were examined. In addition, 7 wipes of food-handler's hands and cooking room were also examined.

As a result, *Salmonella enterica* serovar Enteritidis was detected from "chicken with harusame (bean-jelly)" that had been served on September 6. *S*. Enteritidis was not detected from any wipes.

Stool samples were collected from 81 children, 27 nurses and 3 food-handlers for examination. As a result, *S*. Enteritidis was detected in 65 children, 8 nurses and 2 food-handlers.

Eight isolates (1 from food, 1 from a food-handler, 6 from patients) were tested for their susceptibility to 12 antibiotics (ampicilin, cefotaxime, gentamycin, kanamycin, streptomycin, tetracycline, ciplofloxacin, nalidixic acid, sulfamethoxazole, chloramphenicol, trimethoprim, fosfomycin) using a disk diffusion method; and all of them were resistant to nalidixic acid.

It has recently been reported that the number of nalidixic acid-resistant *Salmonella* strains have been increasing; some of these are also resistant to fluoroquinolones (1). Therefore, isolates were also tested for their susceptibility to norfloxacin, ofloxacin, enoxacin; all of them were susceptible to these fluoroquinolones.

The phage type of all the isolates was PT1. (The phage type was examined at the National Institute of Infectious Diseases, Tokyo.)

Moreover, 5 isolates were also analyzed by pulsed-field gel electrophoresis (PFGE) using Bio-Rad CHEF-DRIII (Bio-Rad, Hercules, Calif., USA). The PFGE patterns digested with *Xba*I and *Bln*l were the same for all 5 isolates (Fig. 2).

According to these biological examination and epidemiological research, the chicken with harusame that had been served on September 6 was determined as the source of infection. The public health center investigated the cooking process for this dish, and the following fact was found. As the chicken meat had been already pretreated (cut into small pieces) and packed, all that food-handlers did was to place it into the pan for cooking. Meanwhile, eggs were broken into the bowl, mixed, and then cooked in the pan.

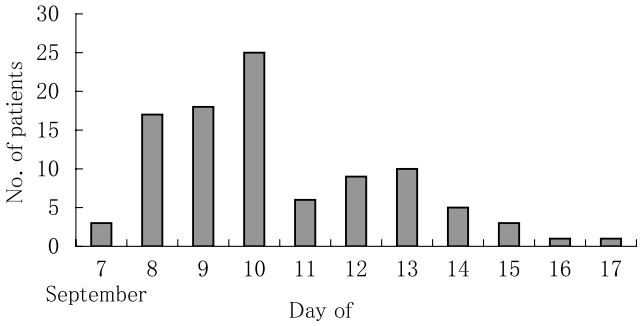

Fig. 1. Number of patients with the onset of the symptom.

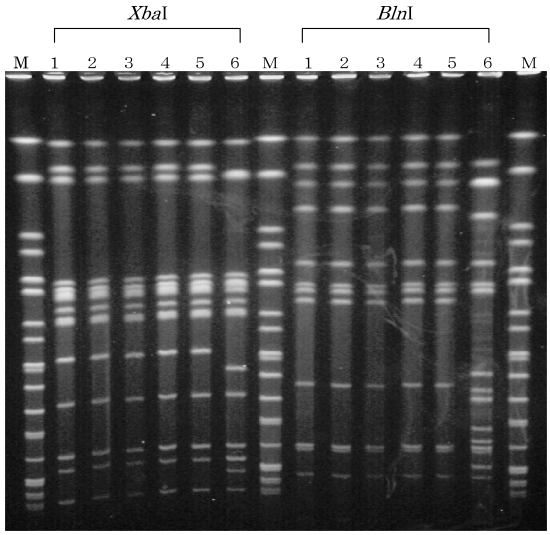

Fig. 2. PFGE patterns of *Xba*I- and *Bln*I-digests of *S*. Enteritidis isolates. Lane 1, isolate from food; 2, isolate from food-handler; 3 - 5, isolates from patients; 6, isolate in other case. M, *Salmonella* Brunderup H9812.

Because both the chicken eggs and meat were heated sufficiently during preparation to kill *S*. Enteritidis, it was suggested that *S*. Enteritidis included in the raw eggs contaminated the food through food-handler's hands or cooking utensils during preparation. However, *S*. Enteritidis was not detected from the stock of chicken eggs or meat remaining from September 6, or from wipes. Thus, the cause of the infection could not be conclusively determined.

*Corresponding author: Mailing address: Kitakyushu City Institute of Environmental Sciences, Shin-ike 1-2-1, Tobata-ku, Kitakyushu 804-0082, Japan. Tel: +81-93-882-0333, Fax: +81-93-871-2535, E-mail: satomi_tokuzaki01@mail2.city.kitakyushu.jp

This article appeared in the Infectious Agents Surveillance Report (IASR), vol. 27, p. 195-196, 2006 in Japanese.

REFERENCE

1. Matsushita, S., Konishi, N., Arimatsu, M., et al. (2000): Increasing nalidixic-acid resistance in *Salmonella* strains isolated from sporadic cases in Tokyo. J. Jpn. Assoc. Infect. Dis., 74, 345-352 (in Japanese).