

Brief Report

Outbreak of *Salmonella oranienburg* infection in Japan

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Abstract: We experienced five cases of *Salmonella oranienburg* infection in children living in Saitama prefecture. Thereafter the number of patients with *S. oranienburg* infection increased not only in Saitama (55 cases) but also in other parts of Japan in 1999 (1,505 cases) in 1999. The source of *S. oranienburg* infection was identified as a snack made from semi-dry cuttlefish.

Key words: *Salmonella oranienburg*, Children, Semi-dried cuttlefish, Japan.

Introduction

Salmonella oranienburg infection has been considered one of the re-emerging infections. It is a food-borne pathogen in human beings. We experienced an outbreak of *Salmonella oranienburg* infection (involving predominantly children), throughout Japan. In this paper, we discuss the peculiar *S. oranienburg* infection, which was caused by snacks made from semi-dry cuttlefish.

Case reports

We experienced five cases of *S. oranienburg* infection in children living in east Saitama prefecture, Japan. The patients were admitted to one of the affiliated hospitals of Tokyo Women's Medical University from January to April in 1999. There were 2 males and 3 females with ages ranging from 2 to 12 years. Clinical signs consisted of fever with diarrhea in 3 cases and fever alone in 1 case, and diarrhea only in 1 case out of 5 cases. Duration of fever was from 8 to 17 days (mean 11 days). Duration of diarrhea was from 3 to 12 days (mean 8.5 days). Blood cultures yielded *S. oranienburg* in 4 patients, who had fever alone, and fever and diarrhea simultaneously. Blood culture was negative in 1 patient, who had only diarrhea. Symptom onset varied from January to April 1999. The four bacteremic patients were treated with antibiotics; cefotaxime (CTX) for 2 cases, ceftazidime (CAZ) for one and fosfomycin (FOM) for one patient. One diarrhea patient was treated with fosfomycin (FOM). All patients recovered uneventfully.

Epidemiology

Salmonella oranienburg infections had been rare in Saitama prefecture until the 1999's outbreak. In 1999, *S. oranienburg* was detected in a total of 55 cases (32 patients and, 23 carriers) including our cases in Saitama. The 32 patients consisted of 29 children under 20 years of age (91%) and 3 adults patients (9%). Thereafter, the outbreak spread almost all over Japan except one prefecture, and a total of

1,505 cases were reported throughout Japan until May 1999. In March 1999, almost 2 months after the first case (our case) was identified, *S. oranienburg* was detected in semi-dry squids in Kanagawa prefecture which is located in the middle part of Japan. An outbreak of food poisoning occurred in a children's festival. In that festival, snacks including semi-dry cuttlefish were given to the children who attended the festival. The semi-dry cuttlefish were processed at a marine products company in Aomori prefecture located in the northern part of Japan. *Salmonella oranienburg* was detected in all the stool specimens from patients of Saitama prefecture, the semi-dry cuttlefish, and the floor of the marine products company. All the *S. oranienburg* strains isolated had the same fingerprint pattern in pulse field gel electrophoresis (Fig. 1).

Discussion

Several *Salmonella oranienburg* outbreaks have been reported in the past (Deeks and Ellis, 1998; CDC 1979; Saito *et al.*, 1982). A typical outbreak was reported in Canada (Deeks and Ellis, 1998) where 24 patients suffered *S. oranienburg* infections. All patients ate cut melons that were suspected to be responsible for the outbreak. In general, fresh fruits, especially those imported from Asian countries are common causes of *S. oranienburg* infections. In contrast to past outbreaks, our case was extraordinary because a semi-dry food (cuttlefish) contaminated with *S. oranienburg* caused the outbreak. So far, it was not known that any semi-dry food (semi-dry squid) might become a vehicle for food-borne infection of *S. oranienburg*. In fact it took about two months since the first case (our case) was detected to find the source of infection. The contaminated food (semi-dry cuttlefish) was among the snacks given out to children in a Japanese festival. The fact that pediatric patients were dominant in this outbreak might be explained by the contaminated cheap snacks which are easily accessible to children at various types of stores.

Drastic changes in distribution of food systems in recent years have allowed delivery of some food products to

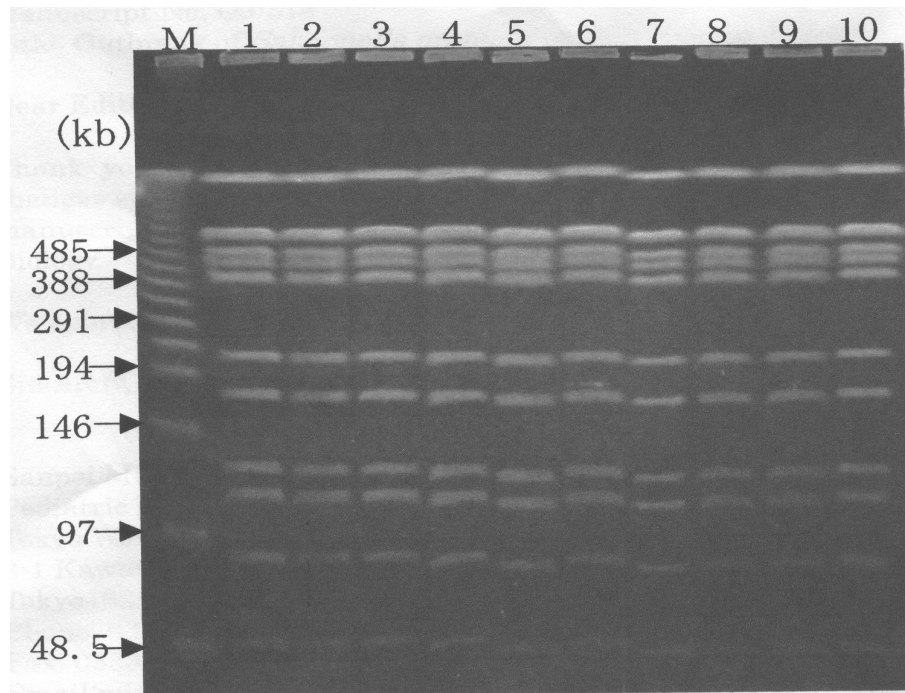


Fig. 1 : Fingerprint patterns obtained from PFGE of BlnI-digested DNA of clinical and environmental *S. oranienburg* isolates. Lane M, λ ladder maker; Lanes 1 to 4, environmental *S. oranienburg* isolates; and lanes 5 to 10, clinical *S. oranienburg* isolates.

vast areas, which could end up in spreading outbreak (Nakano *et al.* 2002; Nizuma *et al.*, 2002). A more rapid and effective clinical epidemiological system should be developed in order to eradicate such huge outbreaks. *Salmonella oranienburg* has been detected repeatedly in various regions in Japan. Quite interestingly, *S. oranienburg* detected in human beings correlates with environments (Motsoela *et al.*, 2002; Nakamura and Amano, 1994). This fact may explain how semi-dry cuttlefish was contaminated. In this case, feces of seabird in which *S. oranienburg* was isolated may be responsible. It is speculated that the cuttlefishes had been contaminated with *S. oranienburg* during unloading.

Concerning virulence among salmonellas, *S. enteritidis* is thought to be most potent. Although basically *S. oranienburg* is thought to be less virulent, 4 out of 5 of our patients suffered from bacteremia. The clinical manifestation resembled that of *S. enteritidis*. Not only *S. oranienburg* but *S. chester* was also detected in the contaminated semi-dry squid, suggesting mixed infections with *S. oranienburg* and *S. chester* in this outbreak.

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