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A Food-Borne Norovirus Outbreak at a Primary School in Wakayama Prefecture

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We experienced a norovirus (Genogroup II) outbreak at a primary school in the southern part of Wakayama Prefecture that was highly comparable with the prior school lunch outbreak in November 2005.

On Thursday, 24 November 2005, the head teacher of a primary school reported by telephone to Tanabe Public Health Centre that 69 pupils out of 93 (74%) were absent due to vomiting and diarrhea, and that the school doctor (KM) had decided to close the school until the following Monday, 28 November. The school at that time consisted of 93 students, 11 teachers, and 2 cooks.

An investigation was performed on all 106 persons by telephone interviews and direct interviews at their own homes to determine whether they had nausea, vomiting, or diarrhea, and when their symptoms manifested. For hygienic investigations, a frozen sample of the lunch served on 22 November was available, and swab specimens from cooking tools, includ-

ing chop board and knives, water taps in the canteen, canteen tables, table towels, were also examined for noroviruses. Stool specimens were collected from 4 symptomatic persons (a teacher and 3 children), and from the 2 cooks. In this municipality, breads were made and delivered by a bakery for all the primary schools. Although there was no indication of a widespread outbreak throughout the municipality at the beginning of the survey, we also obtained stool samples from bakery workers. All the specimens were tested by the real-time PCR method (1).

For interviews, we tried to apply a master-table method. However, each lunch except for the frozen sample had been completely eaten, and the method was not applicable. The head teacher normally ate the same lunch as the pupils, but he had not done so on 22 November due to his attendance at an out-of-town conference. He was asymptomatic, but the vice head teacher who had eaten the same lunch as the pupils was affected. A girl was absent on 22 November due to a severe toothache, and she was also asymptomatic. These circumstances suggested that the lunch on 22 November was the cause of the outbreak.

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Figure 1 summarizes the distribution of symptomatic individuals by 6-h period. There was no diarrheal incident before 22 November. Eighty-five individuals out of 105 lunch eaters (81%) showed symptoms. Of these 85 persons, 74 (87%) were affected synchronously between noon on 23 November to 6 a.m. on 24 November (24 h to 42 h after the lunch of 22 November). We detected norovirus (Genogroup II) from 4 affected stools, while other specimens turned out to be norovirus negative.

Table 1 shows the ingredients and macro-nutrients of the lunch. The champon was served after cooking at 100°C, and all the vegetables were washed 3 times in a chlorinated stream. The lunch specimens were completely negative for norovirus. The canteen had a large room for grade 3 to grade 6 students and a smaller room for grade 1 and 2 students. The incidence rate in the large room was 91%, and that in the smaller room was 66%, but we found no logical explanations for this discrepancy. There was a possibility that asymptomatic eaters were also affected but not apparently so. Although the 2 cooks ate the lunch dish before serving the teachers and children, both of them were norovirus negative. Additional investigations clarified that the bread served on 22 November was not causative, since symptomatic claims from other schools were absent.

For the control of this outbreak and the prevention of norovirus infections to other schools, we communicated the information about this outbreak to the health section and the Educational Board of the municipality. The information was also delivered to hospitals and local medical association members so that symptomatic patients would be treated carefully. The P.T.A. of the school suggested the need for an early

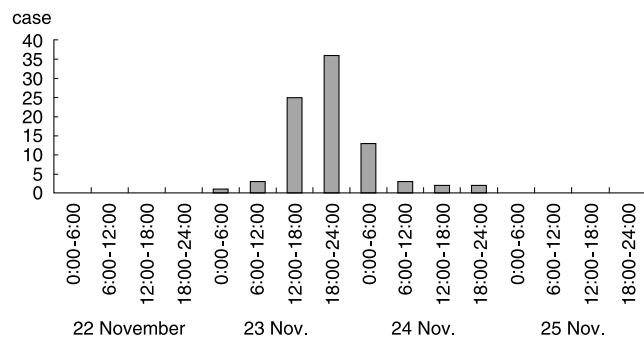


Fig. 1. Distribution of symptomatic cases in November 2005.

Table 1. Menu of the lunch on 22 November 2005

bread
a dish of noodles with seafood and vegetables (champon)
Chinese noodle
squid
shrimp
bean sprouts (moyashi)
carrot
Chinese cabbage (hakusai)
Jew's ear (kikurage)
Welsh onion (naga-negi)
apple salad
apple
cucumber
cabbage
yogurt

explanation by authorities. Therefore, we conducted a conference for the P.T.A. at the school on Saturday, 26 November, after getting results of norovirus detections. Although we had conducted a campaign for washing hands with a chlorinated stream and careful treatments for ingested foods and stools on 25 November, some familial infections had already occurred by that time. At the conference, we again emphasized the importance of washing hands.

Since the establishment of a norovirus detection method, many outbreaks have been reported throughout Japan, especially from kindergartens (2) and nursing homes (3). Previously the virus was called SRSV (small round structured virus) and it was often isolated from oysters (4). Although oysters were not used in the lunch of 22 November 2005, seafoods such as squid and shrimp were served. Even though norovirus was not detected from the lunch, the synchronous appearance of symptomatic individuals well supports that the incident was food-borne. It is widely accepted that oil and fat in the food often prevent the isolation of noroviruses in the food. The same mechanism may have occurred in this outbreak.

Needless to say, school lunch must be safe (5). As for this school, the kitchen twice recorded a score of 97 points (out of a possible 100), in May 2004 and May 2005, from hygienic inspectors from Tanabe Public Health Centre, and this was almost the highest mark attainable. We should note that more than 1,000 food poisoning cases are reported every year from schools in Japan (5). Retrospective evaluations following this outbreak found no false maintenance at school before or after the incident. We should consider that there is always a possibility of food poisoning, even when everyone pays full attention to proper hygiene.

With regard to secondary disseminations, we experienced 14 additional cases from symptomatic families, and one of them was confirmed as norovirus positive. Although 85 cases could have caused widespread familial infections, only 14 cases from 10 families were found. We think that this may have resulted from our hygienic campaign and early explanation of the incident for the P.T.A.

We are grateful to all the students and their families for their contribution to the study, and to all the public health nurses who conducted telephone interviews and investigations of the infected population.

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