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An Outbreak of *Campylobacter jejuni* Food Poisoning Caused by Secondary Contamination in Cooking Practice at a High School

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In May 2005, an outbreak of gastroenteritis occurred among 3rd-year students in a high school in Chiba Prefecture, Japan. The outbreak was recognized when an increase of the number of patients who had developed diarrhea continued for 2 weeks at local hospitals. An epidemiological investigation revealed that the patients had attended cooking practice at the high school and had eaten the cooked chicken for their

lunch. Several days after the meals, they complained of a fever, diarrhea, abdominal pain, nausea, vomiting and/or headache (Fig. 1). Most of the patients belonged to class A, B or E. *Campylobacter jejuni* was isolated from the stools of 10 patients in the 3 classes, and both *C. jejuni* and *C. coli* were isolated from the stool of a patient in class A.

The serotypes of 11 isolates of *C. jejuni* were untypable. Pulsed-field gel electrophoresis (PFGE) analysis using *KspI* and *SmaI* double-digestion technique (1) was performed for 11 isolates of *C. jejuni*. PFGE profiles of the isolates were separated into three types (I, II and III) (Table 1). Type I isolates were derived from the patients in each class A, B

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Table 1. PFGE profiles of *C. jejuni* isolates double-digested with *KspI* and *SmaI*

Class	Date of cooking	No. of isolates		
		Type I	Type II	Type III
A	May 11	2		
B	May 13	2	2	
E	May 16	3	1	1

and E; type II isolates were derived from the patients in both class B and E, and type III isolate was derived from only one patient in class E. These data suggested that the outbreak of *Campylobacter* enteritis in the three classes was caused by some food contaminated with *C. jejuni* of PFGE type I, and presumably a contamination of *C. jejuni* of PFGE types II and III.

The menu of the cooking practice was chicken meat with rice and vegetables, fish soup and vinegared cabbage seasoned by sesame. The students of 5 classes cooked the same menu on different days (Fig. 1). Every food for the cooking was delivered by a single wholesaler on the morning of the cooking practice. Although the epidemiological analysis could not detect a causative agent from foods, the chicken used in the cooking practice was suspected to be a cause of the outbreak of *C. jejuni* enteritis, because it is widely assumed that chicken is commonly contaminated by *Campylobacter* spp. The chicken used for the cooking was harvested in one chicken farm and one slaughter facility where a probable contamination of *C. jejuni* had gradually spread during the period of May 11-16.

The frequencies of illness among the students in class A, B and E were 30.6, 22.9 and 33.3%, respectively (Fig. 1). For the cooking practice, the classes were divided into small groups (4 or 5 students per group), and the frequency of illness was quite different among the groups (Fig. 2). In some groups, nobody developed the illness; in other groups, everybody developed illness. These data suggest variation of the rate of contamination of food among the groups. However, the chicken was heated together with rice and vegetables in an electric rice cooker at the same conditions in all groups. It was the most likely that the chicken was handled improperly in some groups, and secondary contamination of food, especially the food that was eaten raw or undercooked, occurred through the cookware or hands in the high-incidence groups.

Handling and consumption of raw or undercooked chicken are major sources of *Campylobacter* enteritis (2,3). Our analysis of the *C. jejuni* food poisoning also suggested that secondary contamination during cooking was an important pathway for infection and that most *Campylobacter* enteritis can be prevented by avoidance of secondary contamination

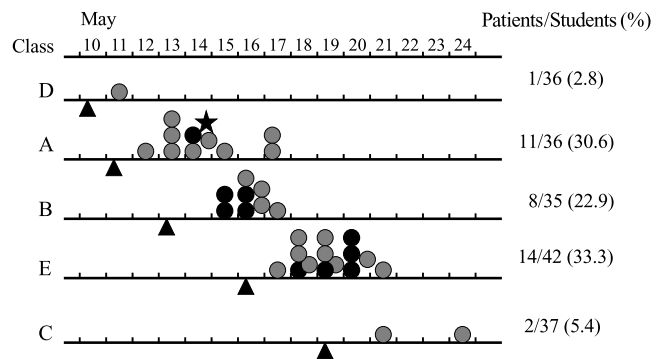


Fig. 1. Distribution of the patients among 5 classes. ▲, cooking practice; ●, patients developed diarrhea; ●, *C. jejuni* isolated from patients; ★, *C. jejuni* and *C. coli* isolated from patient.

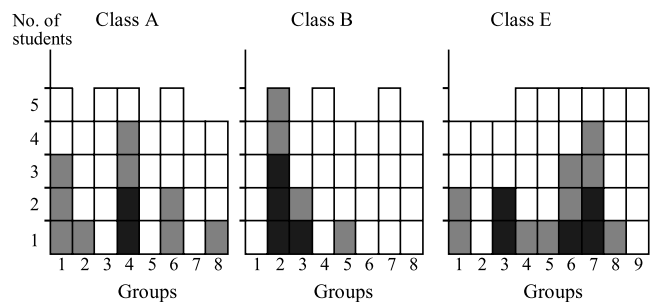


Fig. 2. Distribution of the patients among the groups for cooking practice in 3 classes. □, students attended cooking practice; ■, patients developed diarrhea; ■, patients infected with *C. jejuni*.

to other food.

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