

Laboratory and Epidemiology Communications

An Outbreak of *Salmonella enterica* Serovar Othmarschen at a Funeral Service in Guri-si, South Korea

Shukho Kim, Yea Gyoung Choi¹, Jae Woo Eom¹, Tae Jun Oh¹, Kyung Shin Lee, Sung Hun Kim, Es Ther Lee, Mi-Sun Park, Hee-Bok Oh and Bok Kwon Lee*

Division of Enteric Bacterial Infections, Center for Infectious Diseases, National Institute of Health, Seoul, and ¹Guri Health Center, Guri-si, Korea

Communicated by Haruo Watanabe

(Accepted October 2, 2007)

Salmonella is one of the major contagious enteric pathogens regularly implicated in cases of food-borne disease in Korea. The most frequent serovars isolated from human beings in Korea were *Salmonella enterica* serovar Enteritidis, *Salmonella enterica* serovar Typhimurium, and *Salmonella enterica* serovar Typhi. These serovars were responsible for over 63% of food-borne illnesses recorded during 2004 - 2005 (1). However, *Salmonella enterica* serovar Othmarschen is a relatively rare serovar which has been isolated from humans as well as animals in Korea. *S. Othmarschen* was isolated from humans and calves, and a nosocomial outbreak of *S. Othmarschen* harboring a plasmid encoding for extended-spectrum beta-lactamase TEM-27 was described in previous studies (2-4). In this report, we describe a significant outbreak of *S. Othmarschen*, which resulted in severe salmonellosis, among persons attending a funeral service in Guri-si.

On March 20, 2007, a doctor notified a regional health center that 12 persons, including the chief mourner and condolers, had been admitted to hospitals due to complaints of severe diarrhea and abdominal pains. After this notice, a team of epidemiological investigators conducted interviews, obtained specimens, and evaluated the specimens for pathogens. Their investigations revealed that 300 persons had attended the funeral service and had possibly consumed a common suspicious dish. Among these persons, 72 became ill and had been hospitalized at 22 different hospitals. There were no mortality. The food eaten by the mourners had been provided by a food supplier specialized in the catering of funeral services. According to the results of the interviews, the patients had primarily dined on pan-fried foods containing eggs, squash, and seafood. The principal symptoms reported were diarrhea (98.3%), abdominal pain (96.6%), fever (89.7%), rigor (86.2%), headache (74.1%), nausea (70.7%), and vomiting (37.9%). With regard to the most general symptoms, patients suffered from yellow or white watery diarrhea for a period of 1 to 5 days, with a maximum of 50 incidents. One patient required kidney dialysis due to acute renal failure resulting from dehydration consequent to consecutive diarrheal episodes.

We collected a variety of specimens, including rectal swabs from patients and food handlers, the remaining food, the

ingredients of the foods, and tools and utensils, including the chopping board, knives, and dish towels utilized by the caterers. Microbiological examinations were then conducted on the specimens. *S. Othmarschen* (antigenic formula: 6, 7:g, m:-) was isolated from 3 samples of the remaining food, all of which were pan-fried foods that contained eggs, squash, and seafood, as well as from a food handler and 35 patients.

We conducted antibiotic susceptibility tests and pulsed-field gel electrophoresis (PFGE) with the *Xba*I or *Bln*I restriction enzymes, using the PulseNet standard method for *Salmonella* serovars (5). All 39 of the isolates were found to be susceptible to 16 antibiotics employed in our laboratory, and the isolates uniformly evidenced an indistinguishable pattern from both *Xba*I PFGE and *Bln*I PFGE (Fig. 1). These results strongly indicated that an infected food handler or the contaminated foods themselves represented the origin of the outbreak. For the purpose of comparison of the PFGE pattern with those of overseas *S. Othmarschen* isolates, we uploaded the PFGE results and requested comparison data from PulseNet Asia Pacific Forum homepage (<https://pulsenetap.esr.cri.nz/>). Through the homepage system, PulseNet USA verified that the *Xba*I PFGE pattern of *S. Othmarschen* from the outbreak was indistinguishable from their most frequently detected *S. Othmarschen* PFGE pattern,

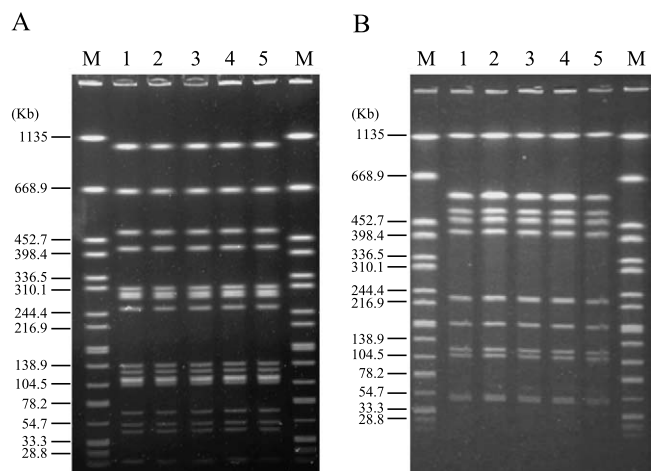


Fig. 1. Representative *Xba*I PFGE (A) and *Bln*I PFGE (B) patterns of *S. Othmarschen* isolates from Guri-si outbreak (lanes 1-5). Lane 1 shows the pattern of isolate from pan-fried foods, lane 2 shows the pattern of isolate from a food handler, and lanes 3-5 were the patterns of isolates from patients. M was an *Xba*I PFGE pattern of *S. Braenderup* H9812 as a molecular size marker.

*Corresponding author: Mailing address: Division of Enteric Bacterial Infections, Center for Infectious Diseases, National Institute of Health, #5 Nokbun-dong, Eunpyung-gu, Seoul, 122-701, Republic of Korea. Tel: +82-2-380-1462, Fax: +82-2-352-4767, E-mail: bokrates@nih.go.kr

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As was mentioned above, *S. Othmarschen* is one of the less frequently isolated serovars in Korea. It remains unknown as to how and what degree the clonal *S. Othmarschen* isolates exist in different countries. This pathogen should clearly be included in the class of pathogens which are monitored for early prevention, as it causes a particularly formidable salmonellosis characterized by severe diarrhea.

An egg was the common ingredient in all of the contaminated foods detected in this incident. However, we were not able to obtain any statistically significant evidence confirming that egg was the source of the infection. According to interviews with the food handlers, they had refrigerated the food immediately after preparation in the morning, and the mourners had eaten the food that night. Complete cooking and safe food storage should clearly be emphasized as a matter of course, but chicken and egg products should be very closely controlled and examined in order to prevent further salmonellosis outbreaks.

We would like to thank the microbiologists at the Gyeonggi-do, Gyeonggi-do North Branch Office, as well as those at the Seoul Institutes of Health & Environment, for their contribu-

tions to this outbreak investigation. We would also like to thank Dr. Brent J. Gilpin and Chris Perry for their help in conducting international comparison analyses of the PFGE patterns.

This study was supported by an intramural grant from the Korea Centers for Disease Control & Prevention.

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