Original Report

Outbreak of *Salmonella enteritidis* Gastroenteritis: Investigation by Pulsed-Field Gel Electrophoresis

Kwai-Lin Thong, PhD;* Savithri Puthucheary, MBBS;† and Tikki Pang, PhD‡

ABSTRACT

Objective: Pulsed-field gel electrophoresis (PFGE) was used to investigate an outbreak of gastroenteritis caused by *Salmonella enteritidis*. The outbreak occurred among university undergraduates who consumed contaminated food.

Method: Molecular typing was done by analyzing DNA band patterns of isolates of *S. enteritidis* after digestion of chromosomal DNA with infrequently-cutting restriction endonucleases *Xba*I, *Avr*II, and *Spe*I and separation of DNA fragments using PFGE.

Results: Twenty-nine outbreak isolates of *S. enteritidis* had identical or highly similar PFGE patterns, whereas different PFGE patterns were observed among three epidemiologically unrelated isolates obtained during the same period.

Conclusion: The data obtained confirm the value of PFGE in epidemiologic investigations of outbreaks caused by *S. enteritidis*.

Key Words: *gastroenteritis, PFGE typing,* S. enteritidis

Int J Infect Dis 1998; 2:159–163.

Salmonellosis is the most economically important foodborne disease of man, and acute gastroenteritis caused by *Salmonella* spp remains a major global public health problem with an annual incidence of 1.3 billion cases with 3 million deaths. Consumption of food of animal origin by far is the main method of transmission of nontyphoidal salmonellosis, with *Salmonella enteritidis* from poultry taking over from *S. typhimurium* as the main culprit in the industrialized world. There are few data on the incidence of salmonellosis in the developing countries, where only 1 to 10% of cases are reported and where the disease may be more severe, often being associated with 20 to 30% mortality. Most cases of *S. enteritidis* gastroenteritis occur sporadically or as limited outbreaks, but recent reports of large, hospital- and nursing home-associated outbreaks emphasize the importance of the problem.

As a result of the prominence of *S. enteritidis* as a cause of gastroenteritis, there has been great interest in the application of the newer molecular typing methods to improve the identification and differentiation of individual isolates. It has been suggested that the standard methods for typing *S. enteritidis*, which include serotyping, biotyping, plasmid analysis, and phage typing, may not be sufficiently discriminative, as it has been reported that more than 75% of the *S. enteritidis* isolated during multiple outbreaks belong to a single phage type.[1] Recently, a variety of DNA-based techniques, including random chromosomal probes, IS200 profiling, ribotyping,[2,3] pulsed-field gel electrophoresis (PFGE),[4] and arbitrarily primed polymerase chain reaction (PCR),[5,6] have been successfully applied in differentiating isolates of *S. enteritidis*. In this article the further application of macrorestriction DNA analysis using PFGE is reported for investigating an outbreak of acute gastroenteritis caused by *S. enteritidis* in a university student community in Kuala Lumpur, Malaysia.

MATERIAL AND METHODS

A total of 32 human isolates of *S. enteritidis* from feces were analyzed in this study. The organisms were isolated, maintained, and identified using standard methods. Of the 32 isolates studied, 29 were obtained from individual cases during an outbreak of gastroenteritis among undergraduates residing in two residential dormitories in a leading university in Kuala Lumpur, Malaysia, during the period January 4 to 6, 1995. All the students involved were initially treated at the student health clinic, but six were subsequently hospitalized at the University Hospital for further treatment. All the infected students had obtained food (chicken and beef satay, chicken curry, and iced beverages containing coconut milk) from a nearby

*Centre for Foundation Studies in Science; †Department of Medical Microbiology; and ‡Institute of Postgraduate Studies & Research, University of Malaya, Kuala Lumpur, Malaysia.

Received: January 3, 1997; Accepted: July 8, 1997.

The research described in this paper was funded by IRPA Grant Nos. 06-02-03-0020 and 06-02-03-0021 from the Ministry of Science, Technology & Environment, Malaysia, and Grants 30331B and 37295 from the National Working Group on Biotechnology, Ministry of Science, Technology & Environment, Malaysia.

Address correspondence to Professor Tikki Pang, Institute of Postgraduate Studies & Research, University of Malaya, 50603 Kuala Lumpur, Malaysia.