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Subtyping of *Salmonella enterica* serovar Muenchen by Pulsed-Field Gel Electrophoresis, Plasmid Profiling and Antimicrobial Susceptibility Testing

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ABSTRACT The genetic relatedness of 16 *Salmonella enterica* serovar Muenchen strains from clinical and food samples in Malaysia was determined by pulsed field gel electrophoresis (PFGE), plasmid profiling and antibiotic susceptibility tests. All 16 strains were resistant to tetracycline and two gave additional resistance to streptomycin. Plasmid analysis generated eight unique patterns consisting of one to 10 plasmids. The only food isolate had the highest numbers of plasmids. PFGE with three restriction enzymes (RE) *Avr*II, *Spe*I, and *Xba*I resulted in 11, 9 and 12 distinct profiles respectively. *Xba*I was therefore the most discriminative RE. *Salmonella* Muenchen strains were quite diverse with 13 different combined subtypes. Three strains (SMC 5, 6, 8) isolated from different parts of Malaysia between March to August 1997, were indistinguishable by all the tests, indicating the prevalence of this subtype of *S.* Muenchen during study period. Based on *Spe*I and *Avr*II restriction, the food isolate was indistinguishable with one the clinical isolates (SMC 16). This study reiterates the usefulness of PFGE for both long-term and short-term epidemiological study of salmonellosis. The technique is highly discriminative, reproducible, and easy to perform and results could be obtained within 2 days. The data also suggest that multiple subtypes of *Salmonella* Muenchen are endemic in Malaysia and coexist simultaneously to cause sporadic cases of gastroenteritis.

ABSTRAK Hubungan genetic sebanyak 16 *Salmonella enterica* serovar Muenchen strain daripada sampel klinik dan makanan di Malaysia telah ditentukan melalui kaedah 'pulsed-field gel electrophoresis' (PFGE), profail plasmid and ujian kerintangan antibiotik. Kesemua 16 strain didapati merintang antibiotik tetracycline dan dua strain lain mempunyai rintangan terhadap tetracycline dan streptomycin. Analisis plasmid menunjukkan lapan corak unggul yang mempunyai 1 hingga 10 biji plasmid. Hanya isolat dari makanan mengandungi plasmid terbanyak. PFGE dengan menggunakan tiga jenis enzim sekatan *Avr*II, *Spe*I dan *Xba*I masing-masing memberikan 11, 9 and 12 corak yang berbeza. Oleh itu, *Xba*I merupakan enzim sekatan yang paling diskriminatif. Strain-strain *Salmonella* Muenchen menunjukkan kepelbagaian dengan 13 gabungan subtip yang berlainan. Tiga strain (SMC 5,6,8) yang dipencilkan antara bulan Mac hingga Ogos, 1997 dari berbagai tempat di Malaysia tidak dapat dibezakan oleh semua kaedah analisis. Ini menunjukkan kewujudan subtip sejenis ini sepanjang tempoh kajian. Berdasarkan enzim sekatan *Spe*I dan *Avr*II, isolat makanan tidak dapat dibezakan dari isolat klinik (SMC 16). Kajian menegaskan kelebihan PFGE untuk kajian epidemiologi *Salmonella* dalam jangka masa pendek dan panjang. Teknik ini mempunyai darjah diskriminasi yang tertinggi, boleh diulangi, senang dijalankan dan keputusan boleh didapati dalam tempoh 3 hari. Hasil kajian ini juga menunjukkan bahawa berbagai jenis subtip *Salmonella* Muenchen adalah endemik, wujud serentak di Malaysia dan menyebabkan kes-kes gastroenteritis sporadik.