

## Determination and Characterization of Extended-Spectrum $\beta$ -lactamases Producing *Klebsiella* Strains Isolated in Malaysia

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*Klebsiella* is an important opportunistic pathogen that causes bacteraemia, urinary tract infections, intra-abdominal infections and pneumonia, in immunocompromised individuals and the prevalence of multiple resistant isolates has been increasing worldwide. Antimicrobial susceptibility test and DNA fingerprinting was carried out on 51 clinical strains, obtained from tracheal aspirates, urines, blood, and swabs of patients from various public hospitals in Malaysia. Using the disk diffusion method, the resistant rates were: ampicillin 96%, piperacillin 61%, aztreonam 45%, ceftazidime 41%, ceftriaxone 35%, cefoperazone, kanamycin and nalidixic acid 33% each, gentamicin 27%, amoxicillin clavulanate and ciprofloxacin 10% each, and cefepime 8%. All the 51 strains were extended-spectrum beta-lactamases producers (ESBLs) and 31 were multi drug resistant (MDR) i.e. (resistant to 2 or more classes of antimicrobial agents.  $Bla_{SHV}$ ,  $Bla_{TEM}$  and  $Bla_{OXA}$  genes were detected in 46, 2 and 5 strains respectively. Enterobacterial repetitive intergenic consensus (ERIC) and repetitive extragenic palindromes (REP) were used to subtype these microorganisms to determine their genetic diversity. The clinical *Klebsiella* strains obtained from sporadic cases of infections were very diverse as determined by 2 PCR fingerprinting techniques. REP-PCR and ERIC-PCR generated 50 PCR patterns and 47 PCR patterns respectively. Two of the *K. pneumoniae* strains were indistinguishable by PCR fingerprinting. There was no correlation between the MDR bacteria and DNA fingerprints. All the DNA fingerprints were equally discriminative and were useful to subtype *Klebsiella*. Imipenem seems to be the most active agent against *Klebsiellae*. In conclusion, all the *Klebsiellae* were ESBL producers and the strains were very heterogeneous.