Clinical and molecular characteristics of neonatal Extended-Spectrum β-Lactamase-producing Gram-Negative Bacteremia: A 2-year case-control-control study of a teaching hospital in Taiwan

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**Background:** To assess the clinical features, risk factors, Molecular Epidemiology and outcome of Extended-Spectrum β-Lactamase (ESBL)-producing Gram-Negative Bacteremia (GNB) in the neonatal intensive care unit.

**Methods:** Risk factors were assessed using a case-control-control study. Clinical features of ESBL producers were compared with a susceptible control group and the influence of ESBL production on mortality was studied in all study subjects. ESBL-GNB isolates were microbiologically characterized.

**Results:** We identified 77 episodes of ESBL-GNB (14.2% of all neonatal late-onset GNB), which were caused by *Klebsiella* spp. (62.3%), *E. coli* (20.8%) and *Enterobacter* spp. (16.9%). Most ESBL-GNB strains were genetically unrelated and the SHV-type ESBLs were the most prevalent (67% of isolates). Comparison with both control groups disclosed previous usage of 3rd generation cephalosporin (odds ratio [OR], 4.72; 95% confidence interval [CI], 2.03-10.97), and underlying renal disease (OR, 4.07; 95% CI, 1.10-15.08) as independent risk factors for ESBL-GNB. Inadequate empiric antibiotics, a higher illness severity, higher rates of infectious complications and sepsis-attributable mortality were more frequently seen in neonates with ESBL-GNB than those with non-ESBL GNB (20.8% and 15.6% vs. 9.2% and 7.9%, respectively; P=0.008 and 0.049, respectively). Neonates with underlying secondary hypertension and infectious complications after bacteremia were identified as independent risk factor for in-hospital mortality.

**Conclusion:** ESBL-GNB accounted for one-seventh of all neonatal gram-negative bacteremia, especially in neonates exposed to broad-spectrum cephalosporins. Neonates with ESBL-GNB bacteremia more frequently received inadequate empirical antibiotic therapy, which were associated with a higher rate of infectious complications and an adverse outcome.

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