

Outbreak of CTX-M-15 and SHV-12 Extended-Spectrum β -Lactamase (ESBL) Co-Producing *Klebsiella pneumoniae* in a Neonatal Intensive Care Unit (NICU), in Ha'il, Saudi Arabia

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ABSTRACT

Background: There has been a rapid and global dissemination of extended-spectrum- β -lactamase (ESBL) producing *Escherichia coli* and *Klebsiella pneumoniae* in the hospital settings. The aim of this study was molecular characterization of *Escherichia coli* and *Klebsiella pneumoniae* isolated from an outbreak in a neonatal intensive care unit (NICU), in Ha'il, Saudi Arabia.

Materials and methods: An outbreak of 3rd generation cephalosporin resistant infections was reported within a neonatal intensive care ward in a maternity hospital at Ha'il, Saudi Arabia. The bacteria cultured were identified by routine and automated identification system. Antibiotic resistance testing was performed using VITEK 2 and Microscan. The presence of *bla*TEM, *bla*SHV and *bla*CTX-M antibiotic resistance genes was performed PCR. Isolate genotyping was performed using pulsed field gel electrophoresis.

Results: A total of 41 *K. pneumoniae* isolates were cultured from neonates with the majority of isolates (95.1%) being resistant to 3rd generation cephalosporins. A total of 87.8% (36/41) *K. pneumoniae* were co-producers of CTX-M-15 and SHV-12. Further, 4.8% were CTX-M-2 producers and 63.4% were positive for TEM-1.

A total of 19 *E. coli* isolates were cultured from neonates, with the majority of isolates (17/19) being resistant to 3rd generation cephalosporins. A total of 21.0% were co-producers of CTX-M-15 and SHV-12. Further, 31.6% were positive for CTX-M-2 and 57.9% were TEM-1 positive.

The majority (31/41) of *K. pneumoniae* isolates belonged to a single genotypic lineage at the 85% similarity level, while *E. coli* isolates grouped into 2 genetic clusters at 80% similarity (18/19 isolates).

Conclusion: This is the first report of CTX-M-15-positive, ESBL *E. coli* and *K. pneumoniae* isolates recovered from an outbreak in a NICU in Ha'il, Saudi Arabia. It is alarming to notice a high rate of outbreak isolates with simultaneous production of CTX-M-15 and SHV-12 conferring high level resistance to oxyimino-cephalosporins.

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