



The Epidemiology of Extended Spectrum Beta-Lactamases Producing *Klebsiella pneumoniae* that contain QNR Genes in Kuwait



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Introduction

Resistance to fluoroquinolones is considered highly important in *Klebsiella pneumoniae*. It arises as a result of alterations in chromosomal DNA gyrase and topoisomerase IV and changes in drug entry efflux. Plasmid mediated *qnr* genes also contribute to fluoroquinolone resistance. The aim of this study was to investigate the epidemiology of extended spectrum beta-lactamase producing *Klebsiella pneumoniae* that contain *qnr* genes in Kuwait.

Materials and Methods

- Antibiotic susceptibility testing and ESBL production was performed by automated broth micro-dilution method (Vitek2) and disc diffusion according to the CLSI guidelines.
- PCR was performed for *SHV*, *TEM*, *CTX-M*, *NDM*, *PER*, *VIM*, *aac(6')-Ib Ib-cr*, *GEM*, *gyrA*, *parC*, *KPC* and *qnrA*, *qnrB* & *qnrS*.
- PCR products were sequenced and analysed. Pulsed-field gel electrophoresis (PFGE) was used.

References

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Results

- From 832 *Escherichia coli* collected from 2010-2012, 174 were *qnr* positive ESBL producing *K. pneumoniae* that contained the aminoglycoside-modifying enzyme *aac(6')-Ib Ib-cr*.
- 74.30% of the isolates harboured *qnrB*, 14.3% *qnrS* and in only 2.9% of the isolates; *qnrA* was present. CTX-M-15 was the most common ESBL followed by CTX-M-2.

Hospital	(ESBL)	<i>K. pneumoniae</i> ESBL producers	<i>qnr</i> positive <i>K. pneumoniae</i>	<i>qnrA</i>	<i>qnrB</i>	<i>qnrS</i>
Amiri	480	15 %	33.3%	0	75%(9)	(3)
KOC	137	27.5%	58 %	9%(1)	(9)	(1)
Adan	215	26 %	21.4%	0	(5)	(1)

Table: The percentage of *qnr* positive ESBL producing *K. pneumoniae* obtained from each hospital.

In total 3.5% (n=29/832) of ESBL producing Enterobacteriaceae were ESBL producing *K. pneumoniae* which also contained a plasmid mediated *qnr* gene.

In total 3.4% (n=1/29) of ESBL- *qnr* positive isolates contained *qnrA*.

In total 79.3% (n=23/29) of ESBL- *qnr* positive isolates contained *qnrB*.

In total 17.2% (n=5/29) of ESBL- *qnr* positive isolates contained *qnrS*.

Conclusions

- Previous studies suggested low prevalence of *QnrB* determinants among ESBL-producing *K. pneumoniae* isolates and the lack of detection of *QnrA* and *QnrS* in Kuwait.
- We have identified all three *qnr* genes at a higher rate. For almost all the cases, the presence of any of the *qnr* genes among ESBL producers did not cause resistance to fluoroquinolones even with the presence of *aac(6')-Ib Ib-cr*.