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Paper Poster Session

Emergence and worldwide outbreaks of carbapenemase-producing bacteria

Prevalence of carbapenemase genes among 16S rRNA methyltransferase-producing Enterobacteriaceae isolated from cancer patients

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Background: The co-existence of carbapenemase and 16S rRNA methyltransferase (16S-RMTase) can cause serious difficulty in treating infections with multidrug-resistant Gram-negative pathogens in cancer patients. We investigated the prevalence of carbapenemase genes in 16S-RMTase-producing *Enterobacteriaceae* isolated from cancer patients in Bulgaria.

Material/methods: One hundred 16S-RMTase-producing isolates collected consecutively during 2006-2015 at the Cancer hospital of Sofia were studied. Multiplex polymerase chain reaction (PCR) using nine sets of carbapenemase specific primers (VIM, IMP, SIM, GIM, SPM, NDM-1, KPC, GES, OXA-48) followed by sequence analysis of PCR amplicons were used to identify carbapenemase genes. Screening for associated ESBL and AmpC-type genes was carried out by PCR-based assays and PCR products were sequenced. Genotyping, by pulse-field gel electrophoresis (PFGE) of genomic DNA was performed to determine genetic relatedness of carbapenemase-producing isolates.

Results: Among the one hundred 16S rRNA methyltransferase-producing enterobacterial isolates, 16 were positive for carbapenemase genes. VIM-1 carbapenemase gene was detected in 15/16 *armA*-positive *Proteus mirabilis* isolates, and co-existence with *bla*_{SHV-12} and *bla*_{CMY-99} was observed in all of them. These isolates were identical by PFGE, suggesting clonal dissemination of multidrug-resistant *P. mirabilis* strain. In addition, the NDM-1 carbapenemase gene was identified in one *E. coli* strain harboring *rtmB* methyltransferase gene in association with *bla*_{CTX-M-15} and *bla*_{CMY-4}. The remaining 84 enterobacterial isolates, which were *armA*-positive did not possess any of the carbapenemase genes studied.

Conclusions: This study reports on the relatively low prevalence (16%) of carbapenemase genes among 16S rRNA methyltransferase-producing enterobacterial isolates at the cancer hospital in Sofia, and on the co-existence of VIM-1 carbapenemase gene and *ArmA* methyltransferase gene in *Proteus mirabilis* isolated in Bulgaria.