

Study of the frequency of extended spectrum beta-lactamases-producing Enterobacteriaceae isolates collected from hospital and livestock and poultry slaughterhouse swages in Ardabil, 2018-2019

Background & Objectives:

Extended-spectrum beta-lactamase (ESBL) and AmpC type beta-lactamases producing enterobacteriales (ESBL-/AmpC-PE) are considered as a major cause of infections acquired from the hospital as well as the community. *Enterobacteriaceae* spp., as the gastrointestinal flora, make up a large proportion of wastewater bacteria. The present study was aimed to survey the occurrence and molecular characterization of ESBL-/AmpC-PE in wastewater samples of hospital and livestock and poultry slaughterhouses in Ardabil, Iran.

Methods:

In total, 60 samples were collected from wastewaters between June 2018 and July 2019. Enterobacteriaceae isolates was identified using conventional biochemical and molecular tests. Antibiotic resistance profile was determined by the Kirby–Bauer disk diffusion method. Phenotypic screening for ESBL and AmpC type beta-lactamases production were performed by double-disk synergy and disc potentiation tests, respectively. The AmpC and ESBL-encoding genes were screened by PCR method. ERIC-PCR was used for bacterial molecular genotyping.

Results:

Totally, 75 isolates from hospital and 80 from livestock and poultry slaughterhouse wastewaters were included in this study. Out of 75 isolates from hospital wastewater 35(%46/6), 3(%4) and 4(%5/3) isolates were ESBL-PE, AmpC-PE and ESBL/AmpC-PE respectively. Out of 80 isolates collected from livestock and poultry slaughterhouses wastewater 15(%18/7), and 2(%2/5) were ESBL-PE, AmpC-PE isolates, respectively. Eighty percent of ESBL-PE and 100% AmpC-PE isolates were belonged to poultry slaughterhouse wastewater samples. *bla_{CTX-M}* whit %69/2(27) and %80(12) and *bla_{CIT}* with %85/7(6) and %100(3) were the most frequent ESBL and AmpC encoding genes detected in hospital and salutherhous wastewater isolates, respectively.

In hospital wastewater isolates, the highest resistance was observed for ampicillin %93(70), cefalexin %75(56) and %9(7) and %21(16) lowest resistance was observed to amikacin and imipenem respectively. In slaughterhouses wastewater isolates highest resistance was observed for %88(70), %64(51), while the resistance to imipenem was significantly low.

Based on ERIC-PCR results, ESBL-/AmpC-PE isolates in hospital and slaughterhouses wastewaters were classified into 65 and 16 clusters respectively.

Conclusion:

In this study, ESBL-PE and AmpC-PE isolates were frequently isolated from hospital, poultry and livestock slaughterhouse wastewaters. The occurrence of ESBL-PE and AmpC-PE isolates in sewages may act as potential source for distribution of ESBL-/AmpC-PE isolates into the environment. Therefore, sufficient sanitation infrastructures and antibiotic resistance surveillance programs are critically required in hospitals, livestock and poultry farms and slaughterhouses.

Key words:

Enterobacteriaceae spp, Wastewater, Hospital, Slaughterhouse, Livestock, Poultry, ESBL, AmpC