Fecal carriage of ESBL and pAmpC producing *Enterobacterales* in an Iranian community: prevalence, risk factors, molecular epidemiology, and antibiotic resistance

Background: Enterobacteriaceae are a family of gram-negative intestinal bacteria, most of them exist as normal flora in the digestive system of humans and animals, and some of them also cause opportunistic infections. Today, due to the spread of microbial resistance among the members of this family, such as the production of βeta-lactam ring hydrolyzing enzyme or broad-spectrum βeta-lactamase enzyme, they are the cause of treatment failures, for this reason, they are clinically important, and it is necessary to identify and treat these types of resistance.

Aim: This study was aimed to determine the prevalence and risk factors associated with intestinal carriage of extended-spectrum βeta-lactamases (ESBL-PE) and plasmid mediated AmpC βeta-lactamase (AmpC-PE) producing Enterobacteriaceae in healthy children in Ardabil, Iran.

Materials and Methods: Totally, 305 fecal samples were collected. Isolates underwent antimicrobial susceptibility testing, phenotypic and genotypic identification of βeta-lactamase production and epidemiologic molecular typing.

Results: Totally, 21.5%, 1.5%, and 1.2% of volunteers were ESBL-, AmpC- and simultaneous ESBL-/AmpC-PE carriers, respectively. *E. coli* was predominate ESBL-producing bacterium (29.5%) found in ESBL-PE colonized subjects. Beyond ESBL positive isolates, *bla* $_{\text{CTX-M}}$ group genes were the most common type (75.6%) and *bla* $_{\text{TEM}}$ were in second place (25.6%). Among CTX-M enzymes, CTX-M-1 (55.3%) and CTX-M-15 (55.3%) were the most predominant types. Some isolates were multi-enzyme producers. *bla* $_{\text{CIT}}$ and *bla* $_{\text{DHA}}$ genes were common AmpC type enzyme encoding genes found in AmpC-PE isolates. Most isolates produced both enzymes

at the same time. Family member hospitalization history increased the risk of AmpC-PE isolate colonization ($p<0.05$). Moreover, 46(65.7%), 3(60%), 4(100%) and 100(40.65%) of ESBL-, AmpC-, ESBL/AmpC and non ESBL-/AmpC-PE isolates were multidrug-resistant,

respectively. Overall regardless to beta- lactam antibiotics 2.5%, 3.8%, 22.8%, 39.2%, 62%, 59.5% and 25.3% of isolates were resistant to ampicillin, amikacin, nitrofurantoin, nalidixic acid, co-trimoxazole, tetracycline and imipenem respectively. No O25b-ST131 strain was detected among beta-lactamase producing isolates. According to ERIC-PCR no significant clonal relatedness was found between isolates.

Conclusion*:* This study showed a high rate of multi-resistant ESBL-PE intestinal carriage among healthy individuals in Iran.

Keywords:

Enterobacteriaceae, healthy people, fecal carriage, ESBL, AmpC and antibiotic resistanc.