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Characterization of β-Lactamases Resistance amongst Acinetobacter Baumannii Isolated from Clinical Samples, Egypt

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Abstract : Background: Acinetobacter spp. resistance towards β-lactam antibiotics is mediated mainly by different classes of β-lactamases production; detection of some genes responsible for production of β-lactamases is the objective of the study. Methods: One hundred fifty bacterial isolates were recovered from blood, sputum, and urine specimens from different hospitals in Egypt. Sixty-nine isolate were identified as Acinetobacter baumannii using traditional biochemical tests, CHROM agar, MicroScan and PCR amplification of blaoxa-51like gene. Acinetobacterbaumannii isolates were grouped into carbapenem resistant group (GP1), cefotaxime, ceftazidime and cefoxitin resistant group (GP2) and carbapenem and cephalosporin non-resistant group (GP3). Carbapenemase activity was screened using modified Hodge test (MHT) for GP1.Metallo-β-lactamases screening was performed for MHT positive isolates using double disk synergy test (DDST) and combined disk test (CDT). Amp C activity was screened using Amp C disk test with Tris-EDTA, DDST, and CDT for GP2. Finally, PCR amplification of blaoxa-51like, blaoxa-23like, blaIMP-like, blaVIM-like, and blaADC-like genes was performed for isolates that showed, at least, two positive results of three for both AmpC and carbapenemases phenotypic screening tests (obvious activity), in addition to GP3 (for comparison). Detection of blaoxa-51like and blaADC-like genes preceded by ISAba1 was also performed. Results: Antibiogram of 69 pure Acinetobacter baumannii isolates resulted in 57, 64, and 2 isolates enrolled into GP1, GP2, and GP3, respectively. Carbapenemase activity was shown by 49(85.9%) isolate using MHT. Metallo-β-lactamases screening revealed 32(65.3%) and 35(71.4%) using DDST and CDT, respectively.AmpC activity was shown by 43(67.2%) and 50 (78.1%) isolates using AmpC disk test with Tris-EDTA, and both DDST and CDT, respectively. Twenty-seven isolates showed obvious activity, all of them (100%) were harboring blaoxa-51like and blaADC-like genes, while blaoxa-23like, blaIMP-like andblaVIM-like genes were harbored by 23(85.2%), 9 (33.%) and no isolate respectively. Only 12 (44.4%) isolates harbored blaoxa-51like and blaADC-like genes preceded by ISAba1. GP3 isolates showed only positive blaoxa-51like and blaADC-like genes. Conclusion: It is not possible to correlate resistance with presence of blaoxa-51like and blaADC-like genes and presence of ISAba1 was immediate as transcriptional promoter. A blaoxa-23like gene played an important role in carbapenem resistance when compared with blaIMP-like and blaVIM-like gene.

Keywords : acinetobacter, beta-lactams, resistance, antimicrobial agents
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