Research Article

Prevalence of Plasmid-Mediated Quinolone Resistance Determinants and OqxAB Efflux Pumps among Extended-Spectrum β-Lactamase Producing Klebsiella pneumoniae Isolated from Patients with Nosocomial Urinary Tract Infection in Tehran, Iran

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Objective. Plasmid-mediated quinolone resistance (PMQR) plays an important role in the development of clinical resistance to quinolone. The aim of this study was to investigate PMQR determinants among extended-spectrum β-lactamases- (ESBL-) producing Klebsiella pneumoniae recovered from patients with nosocomial urinary tract infection (UTI). Methods. A total of 247 ESBL-producing K. pneumoniae isolates were collected from 750 patients with UTI. ESBL production was confirmed by double disc synergy test and combined disc diffusion test. The prevalence of PMQR determinants among ESBL-producing K. pneumoniae was assessed using PCR method. Results. The rates of resistance to antimicrobial agents in present study varied from 14.2% to 98.8%. In comparison with other PMQR genotypes, the frequency of aac(6′)-Ib (68.8%) was strikingly high. Of the 247 isolates tested, qnrA, qnrB, qnrS, and oqxA genes were present in 3.6%, 1.6%, 1.2%, and 2%, respectively. oqxA and oqxB were detected in 56.7% and 54.6% of isolates. The predominant coexisting ESBL and PMQR profile among our isolates included blaCTX-M and aac(6′)-Ib, oqxA, oqxB (28.3%) and blaCTX-M, blaSHV, and aac(6′)-Ib, oqxA, and oqxB (19.4%) profile. Conclusion. Given the linkage observed between resistance to quinolones and beta lactam antibiotics, therapeutic protocol with fluoroquinolones and beta lactam antibiotics should be seriously revised in Tehran hospitals.

1. Introduction

K. pneumoniae is common nosocomial pathogen causing urinary tract infection in different wards of hospital including infectious, surgical, and intensive care unit. During the last decade transferable multidrug resistance in Gram-negative bacteria, particularly K. pneumoniae isolates, has become an escalating global threat [1]. Beta lactam resistance is mediated by acquisition of β-lactamase genes that are mostly plasmid encoded. Based on several investigators idea, plasmid-encoded temonera (TEM), sulphydryl variable (SHV), and cefotaximase (CTX-M) are the most prevalent ESBLs [2, 3].

Quinolone resistance among K. pneumoniae clinical isolates became a serious problem in developing countries as well as in developed countries, since the quinolones as broad-spectrum antimicrobial agents are widely prescribed for