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A Comparison of Antibiotic Resistant Enterobacteriaceae: Diabetic versus Non-Diabetic Infections

Authors : Zainab Dashti, Leila Vali

Abstract : Background: The Middle East, in particular Kuwait, contains one of the highest rates of patients with Diabetes in the world. Generally, infections resistant to antibiotics among the diabetic population has been shown to be on the rise. This is the first study in Kuwait to compare the antibiotic resistance profiles and genotypic differences between the resistant isolates of Enterobacteriaceae obtained from diabetic and non-diabetic patients. Material/Methods: In total, 65 isolates were collected from diabetic patients consisting of 34 E. coli, 15 K. pneumoniae and 16 other Enterobacteriaceae species (including Salmonella spp. Serratia spp and Proteus spp.). In our control group, a total of 49 isolates consisting of 37 E. coli, 7 K. pneumoniae and 5 other species (including Salmonella spp. Serratia spp and Proteus spp.) were included. Isolates were identified at the species level and antibiotic resistance profiles, including Colistin, were determined using initially the Vitek system followed by double dilution MIC and E-test assays. Multi drug resistance (MDR) was defined as isolates resistant to a minimum of three antibiotics from three different classes. PCR was performed to detect ESBL genes (blaCTX-M, blaTEM & blaSHV), flouroquinolone resistance genes (qnrA, qnrB, qnrS & aac(6')-lb-cr) and carbapenem resistance genes (blaOXA, blaVIM, blaGIM, blaKPC, blaIMP, & blaNDM) in both groups. Pulse field gel electrophoresis (PFGE) was performed to compare clonal relatedness of both E. coli and K.pneumonaie isolates. Results: Colistin resistance was determined in three isolates with MICs of 32-128 mg/L. A significant difference in resistance to ampicillin (Diabetes 93.8% vs control 72.5%, P value <0.002), augmentin (80% vs 52.5%, p value < 0.003), cefuroxime (69.2% vs 45%, p value < 0.0014), ceftazadime (73.8% vs 42.5%, p value <0.001) and ciprofloxacin (67.6% vs 40%, p value < 0.005) were determined. Also, a significant difference in MDR rates between the two groups (Diabetes 76.9%, control 57.5%, p value <0.036 were found. All antibiotic resistance genes showed a higher prevalence among the diabetic group, except for blaCTX-M, which was higher among the control group. PFGE showed a high rate of diversity between each group of isolates. Conclusions: Our results suggested an alarming rate of antibiotic resistance, in particular Colistin resistance (1.8%) among K. pneumoniea isolated from diabetic patients in Kuwait. MDR among Enterobacteriaceae infections also seems to be a worrying issue among the diabetics of Kuwait. More efforts are required to limit the issue of antibiotic resistance in Kuwait, especially among patients with diabetes mellitus.

Keywords : antibiotic resistance, diabetes, enterobacreriacae, multi antibiotic resistance
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