Emergence of KPC-2-Producing Salmonella enterica Serotype Schwarzengrund in Argentina

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KPC-producing Klebsiella pneumoniae isolates were first reported in the United States in 2001 (1), and since then, KPC-producing Enterobacteriaceae have been isolated as causes of nosocomial and community-acquired infections in various countries (2, 3). The genetic background facilitates spreading of the blaKPC gene, which is located in transposon Tn4401 and may then be carried by different transferable plasmids. Several isoforms of Tn4401 (a, b, c, d, e) have been identified, and plasmids of several incompatibility types have been identified as genetic vehicles of blaKPC in enterobacterial species (4).

In Argentina, blaKPC-2 was first described in 2006 in clinical isolates of K. pneumoniae and Citrobacter freundii (5). Starting in August 2009, there were dramatic increases in the number of blaKPC-2-producing isolates and in the number of hospitals affected, mostly owing to K. pneumoniae strains recovered in Buenos Aires City and Province (6). For the first time, we report here the isolation of KPC-2-producing Salmonella spp. in Argentina.

Isolate 75.534 was recovered from a catheter urine sample from an 18-year-old man in November 2013, 6 months after he was hospitalized with polytrauma caused by a serious accident. During repeated hospital stays, he received several intravenous courses of antibiotic therapy, including ceftriaxone, ceftazidime, and carbapenem. The patient had no history of travel in Argentina or abroad and was not screened for carbapenemase producer colonization.

The isolate was identified as Salmonella enterica using API 20E microbial identification strips (bioMérieux, Marcy l’Etoile, France). Serotyping according to the White-Kauffmann-Le Minor scheme using antisera (Bio-Rad, Marnes-La-Coquette, France) identified serotype Schwarzengrund (antigenic formula 4,12:d:1,7). Multilocus sequence typing (MLST) (7) identified ST96. The antimicrobial susceptibility pattern was established with the disc diffusion method and interpreted as specified by the document M100-S24 of the Clinical and Laboratory Standards Institute (CLSI) (http://www.clinicallab.pier.org/anexos/bibliotecairtual /exposiciones/guia%20CLSI%202014.pdf), except for tigecycline and fosfomycin results, which were interpreted according to the breakpoints proposed by Pasteran et al. (8) (tigecycline, ≥21 or ≤16 mm, and fosfomycin, ≥17 or ≤15 mm, for susceptible or resistant isolates, respectively).

The isolate was highly resistant to β-lactams, including expanded-spectrum cephalosporins (cefotaxime, cefazidime, cefepime) and aztreonam, and showed low-level resistance to carbapenems, with inhibition zone diameters of 20 mm for imipenem and 19 mm for meropenem. The isolate also displayed low-level resistance to fluoroquinolones but susceptibility to gentamicin, amikacin, chloramphenicol, trimethoprim plus sulfamethoxazole, tigecycline, and fosfomycin. The modified Hodge test (9, 10) suggested carbapenemase production. MICs of β-lactams (including penicillins, expanded-spectrum cephalosporins, aztreonam, and carbapenems), aminoglycosides, ciprofloxacin, and colistin were determined by the Etest method (bioMérieux) (Table 1).

Multiplex PCR screening and sequencing performed as described previously (11) confirmed the presence of blaKPC-2. Using PCR screening and sequencing performed as previously published methods (11), β-lactamase genes of the blaTEM, blaSHV, blaCTX-M, and blaOXA types were not found. Using specific primers and sequencing (12), a qnrB19 gene was detected in the parental strain. These results were similar to those of previous reports which demonstrated that KPC-producing isolates are resistant not only to all β-lactam antibiotics, including carbapenems, but also to some non-β-lactam antibiotics, such as fluoroquinolones (13, 14).

Conjugation experiments were performed with Mueller-Hinton broth (bioMérieux) with the sodium azide-resistant strain Escherichia coli J53 as the recipient. Transconjugants were selected on Drigalski agar containing sodium azide (100 μg/ml) and meropenem (2 μg/ml). MICs of carbapenems and ciprofloxacin for the transconjugant were lower than those for the parental strain (Table 1). The presence of blaKPC and qnrB19 was confirmed by PCR.

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already been described as an extended-spectrum β-lactamase producer in Brazilian poultry farms (\(\text{bla}_{\text{CTX-M-2}}\)) (18) and in a Japanese clinical sample (\(\text{bla}_{\text{CTX-M-15}}\)) (19) but never as a carbapenemase producer. The emergence of KPC-2-producing *Salmonella* spp. in Argentina provides further evidence for dissemination of \(\text{bla}_{\text{KPC}}\) among enterobacterial species. National surveillance and early detection of these isolates are of paramount importance for the implementation of appropriate infection control measures.

**REFERENCES**


