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BRIEF COMMUNICATION

KPC-PRODUCING *Serratia marcescens* IN A HOME-CARE PATIENT FROM RECIFE, BRAZIL

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SUMMARY

In this brief communication we describe the occurrence of a KPC-producing *Serratia marcescens* isolate in a home-care patient from Recife, Brazil. The bla_{KPC}, bla_{SPM}, bla_{IMP}, bla_{VIM}, bla_{OXA}, bla_{CTX-M}, bla_{SHV}, bla_{TEM} and bla_{GES} genes were investigated by Polymerase Chain Reaction (PCR) and DNA sequencing. The isolate was positive for bla_{KPC-2} and bla_{TEM-1} and was resistant to aztreonam, cefepime, cefotaxime, imipenem, meropenem, gentamicin, ciprofloxacin and cefazidime, and susceptible only to amikacin, tigecycline and gatifloxacin. This is the first report in Brazil of KPC-producing *S. marcescens* clinical isolate outside of a hospital environment. Caregivers should be alert for the presence of this isolate in the community setting.

KEYWORDS: *Serratia marcescens;* KPC-2 beta-lactamase; Carbapenemase; Multidrug-resistance.

INTRODUCTION

The emergence of *Klebsiella pneumoniae* carbapenemase (KPC)-producing gram-negative bacteria is worrisome due to inter or intraspecies plasmid-mediated transfer of the bla_{KPC} gene[14]. Furthermore, KPC-producing isolates are commonly multidrug-resistant, reducing therapeutic options. Since the first occurrence of KPC-producing *K. pneumoniae* in the United States[18], this enzyme has been described in several countries and in different species, mostly from nosocomial infections[2,3,8,11,13,16]. Nevertheless, the spread of KPC-producing multidrug-resistant isolates in the community can also be a cause for great concern. In this study, we describe the emergence of the bla_{KPC-2} gene in *Serratia marcescens* isolated outside of a hospital environment in Brazil.

MATERIAL AND METHODS

One isolate of *Serratia marcescens* from the tracheal aspirate of a sixty-three-year-old male with amyotrophic lateral sclerosis, diagnosed at a private laboratory in Recife, Brazil, in September, 2010, was analyzed. The patient had been receiving medical attention at home since his last hospitalization in a private hospital, in July, 2010. The isolate was initially identified by biochemical tests and confirmed using MALDI-TOF mass spectrometry methodology (Bruker Daltonics, Germanny).

Susceptibility testing was performed by the Etest (BioMérieux, Marcy l'Étoile, France) for aztreonam, cefepime, cefotaxime, ceftazidime, ciprofloxacin, gentamicin, imipenem and meropenem, and the disk diffusion method[6] for amikacin and gatifloxacin. Minimum inhibitory concentrations (MICs) were interpreted according to Clinical and Laboratory Standards Institute (CLSI) guidelines**.** The modified Hodge test (MHT) with ertapenem disks (10 µg) was used for phenotypic detection of carbapenemase activity[12].

Specific primers were used under standard PCR conditions to detect carbapenemase and ESBL encoding genes such as bla_{SPM}, $bla_{IMP,}$ $bla_{VIM,}$ $bla_{KPC,}$ bla_{CTX-M}, bla_{SHV}, bla_{TEM}, bla_{GES}, bla_{OXA-48}[15], $bla_{OXA-23,}$ $bla_{OXA-24,}$ and bla_{OXA-58}[17], followed by DNA sequencing (ABI 337 sequencer, Applied Biosystems, Foster City, CA). The nucleotide sequences were analyzed with software available at the National Center for Biotechnology Information website (http://blast.ncbi.nlm.nih.gov/Blast.cg).

RESULTS AND DISCUSSION

The *Serratia marcescens* isolate was resistant to aztreonam (MIC, 128 µg/mL), cefepime (MIC, 64 µg/mL), cefotaxime (MIC, 128 µg/mL), ceftriaxone (MIC, > 32 µg/mL), imipenem and meropenem (MIC, > 32 µg/mL), gentamicin (MIC, >32 µg/mL) and ciprofloxacin (MIC, 4 µg/mL) and showed positive MHT results. On the other hand, the isolate was susceptible to amikacin and gatifloxacin, exhibiting reduced susceptibility to cefazidime (MIC, 8 µg/mL). *S. marcescens* carried bla_{KPC-2} (GenBank accession number JX131687) and bla_{TEM-1} genes (GenBank accession number JX293719).

The spread of KPC has been frequently reported in Enterobacteriaceae, mainly in *K. pneumoniae*. In Brazil, the occurrence of KPC-producing S. *marcescens* isolates was reported by DEL PELOSO *et al.*[7] in intensive care unit (ICU) patients with urinary sepsis. Although the occurrence of bla_{KPC-2} in *S. marcescens* isolates has been described in nosocomial strains[4,16], ICU

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patients may continue to be colonized by carbapenemase-producing isolates for long periods after hospital discharge, allowing its potential spread to households and the community[9,10]. In a study conducted by CHEN *et al*.[5] at a hospital in Virginia, USA, 58 patients with a mean age of 70 years were identified with infection or colonization by KPC-producing *K. pneumoniae*, 36% of whom were admitted from nursing homes or long-term care facilities (LTCF). The mean time to isolate a KPC-producing organism was 1.5 days after admission, suggesting that KPC-producing organisms were acquired in the community and that person-to-person transmission of KPC-producing organisms in the community is possible. GOTTESMAN *et al*.[9] described extra-hospital dissemination of a KPC-producing *K. pneumoniae* isolate in Israel, where a patient likely acquired the isolate from his wife, who had been previously hospitalized.

In the present study, the patient probably acquired the KPC-producing *S. marcescens* isolate during his previous hospitalization, since he received homecare after discharge. However, we want to emphasize the occurrence of the bla_{KPC} gene outside the hospital environment, given that this resistance mechanism can easily spread among different species inside hospitals as well as in the community, as previously described[9]. The occurrence of KPC in community isolates of *K. pneumoniae* has only been reported in Brazil by ABBOUD *et al*.[1], in an outpatient from *São Paulo.*

The epidemiology of KPC-producing and multidrug-resistant organisms in a community setting remains poorly understood in Brazil. Thus, caregivers should be alert for the presence of this isolate, and prevention and control measures should be implemented not only in hospitals, but also in the community. The phenotypic and molecular characterization of community isolates can provide the essential data required to avoid the spread of this emerging resistance mechanism in the community.

RESUMO

Serratia marcescens produtora de KPC em paciente sob assistência médica domiciliar em Recife, Brazil

Nesse estudo descrevemos a ocorrência de um isolado de *Serratia marcescens* produtor de KPC em um paciente sob assistência médica domiciliar em Recife, Brazil. Os genes bla_{KPC}, bla_{SPM}, bla_{IMP}, bla_{VIM}, bla_{OXA}, bla_{CTX-M}, bla_{SHV}, bla_{TEM} and bla_{GES} foram investigados pela Reação em Cadeia da Polimerase (PCR) e sequenciamento de DNA. O isolado foi positivo para os genes bla_{KPC-2} and bla_{TEM-1} e foi resistente a aztreonam, cefepime, cefotaxima, imipenem, meropenem, gentamicina, ciprofloxacina e ceftazidima, e susceptível apenas a amicacina, tigeciclina e gatifloxacina. Este é o primeiro relato no Brasil de um isolado clínico de *S. marcescens* produtor de KPC fora de ambiente hospitalar. Os profissionais de saúde devem estar atentos à presença desse isolado na comunidade.

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