LABORATORY DETECTION OF CARBAPENEMASE-PRODUCING Klebsiella pneumoniae AT THE HOSPITAL UNIVERSITÁRIO ANTÔNIO PEDRO, NITERÓI.


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ABSTRACT:

Background: Carbapenem-resistant K. pneumoniae (CRKP) has been emerged as a problematic infectious pathogens worldwide. The mechanisms underlying carbapenem resistance in CRKP include the production of carbapenem-hydrolyzing β-lactamases. An increasingly diverse range of carbapenem-hydrolyzing enzymes are being recognised, including Class A serine-β-lactamases (KPC), Class B metallo-β-lactamases (NDM) and carbapenem-hydrolysing Class D oxacillinases (OXA-48-like). Here, we performed phenotypic and molecular detection of carbapenemase production among CRKP isolates recovered from Hospital Universitário Antônio Pedro (HUAP).

Materials and Methods: We included 14 K. pneumoniae isolates recovered from clinical samples of patients admitted to HUAP (from July/2018 to April/2019). We only considered one isolate per patient. Bacterial identification and antimicrobial susceptibility testing were performed using the BD Phoenix™. Modified Hodge test and modified carbapenem inactivation method (mCIM) in conjunction with EDTA-modified carbapenem inactivation method (eCIM) were used for phenotypic detection of carbapenemase production. For molecular investigations, bacterial DNA extraction was performed by thermal lysis and a conventional PCR assay was performed to detect carbapenemases genes (blaOXA-48-like, blaKPC, and blaNDM). Results: According to the results of the antimicrobial susceptibility testing, the majority of antimicrobials tested showed elevated resistance rate. Ciprofloxacin, cefepime, ceftazidime, imipenem, meropenem, ertapenem, ceftriaxone and piperacillin/tazobactam showed the highest resistance rate (100%, n = 14), followed by ampicillin-sulbactam and sulfamethoxazole-trimethoprim (86.6%, n = 13). Amikacin showed the highest susceptibility rate (86.6%, n = 13). Phenotypic analysis allowed us to discriminate between serine- and metallo-carbapenemases. The presence of blaKPC gene was confirmed in 13 CRKP isolates (86.6%). Results obtained from mCIM/eCIM indicated, for blaNDM-positive (n=1) CRKP isolate, the zone of inhibition of meropenem was 23mm. None was positive for blaOXA-48-like. Conclusions: In the past years, the increase in carbapenem-resistant organisms has become an important medical issue around the world. Here, we observed blaKPC is the main carbapenemase gene in our hospital. Our study indicate mCIM in conjunction with eCIM is an effective method to identify the carbapenemases producers among CRKP clinical isolates.

Keywords: Klebsiella pneumoniae, carbapenem resistance, KPC, NDM.