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Phenotypic and genotypic characterization of carbapenem-resistant Acinetobacter baumannii clinical isolates from Alexandria, Microbiology 2018.

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Antibiotic use in Egypt is generally unregulated, resulting in the emergence of resistance strains. Carbapenems are used as a last option to treat Acinetobacter baumannii infections that have become resistant to other antibiotic classes. However, carbapenem-resistant isolates are becoming more common. The goal of this study was to phenotypically and molecularly characterise seventy-four carbapenem-unsusceptible A strains. Baumannii isolates from Egypt were used to identify the different enzymes involved for carbapenem resistance..

Carbapenemase development was evaluated using several phenotypic approaches, including the modified Hodge test (MHT), carbapenem inactivation (CIM), combined disc test (CDT), CarbAcineto NP test, and boronic acid testing. The polymerase chain reaction (PCR) was employed to examine isolates for the presence of specific genes responsible for carbapenem resistance, as well as insertion sequences.

Acinetobacter baumannii has evolved into a pathogen that poses a concern to human health. It causes nosocomial infections all over the world, including skin and soft tissue infections, wound and bloodstream infections, urinary tract infections, meningitis, and ventilator-associated pneumonia, which is the most common and fatal infection caused by A. Bas-nii. These infections are particularly hazardous due to the pathogen's capacity to tolerate the action of the majority of antibacterial drugs now available, making A. Baumannii one of the most lethal species in the ESKAPE. In addition, the number of community-acquired A.

Carbapenem resistance in A. Baumannii strains is produced by the deletio n or change of porins or, in rare cases, by the alteration of penicillin bindi ng proteins.

The growth of lactamase enzymes, on the other hand, is the primary resist ance mechanism. At A. Bas-
nii, four types of molecular lactamase (A, B, C, and D) were found. Only a few K. Pneumoniae carbapenemase (KPC) type enzymes of class A -lactamases have an effect on carbapenems as compared to those of class B and class D that do. Class B lactamases are metallolactamases (MBL) that require zinc ions for catalytic activity.

The detection of carbapenemases is critical for determining the scope of the problem and guiding the adoption of antimicrobial stewardship recommendations to restrict the formation of carbapenem-resistant variations between A. They are able to isolate the baumannii. In contrast to the numerous phenotypic and molecular methodologies employed in an Egyptian setting to detect these enzymes among CR-AB isolates, the current study describes the prevalence of particular carbapenemases among CR-AB isolates from Alexandria, Egypt.

Discussion

Baumannii is becoming a major issue due to the large number of nosocomial infections produced by this bacterium, mostly in intensive care units (ICUs) around the world. Furthermore, A. Because of the overuse of antibiotics, baumannii has developed resistance to a wide range of antimicrobials, contributing to the preponderance of multidrug-resistant strains, particularly in hospitals. Furthermore, carbapenem resistance. Baumannii isolates limit clinical treatment options for these infections, which may result in increased morbidity and fatality rates. Several previous research have discussed the prevalence of Egyptian A carbapenemases. Baumannii isolates used in clinical trials.

The goal of this study was to classify 74 Egyptian A phenotypically and molecularly. Baumannii isolates the various enzymes that cause carbapenem resistance.

Several phenotypic approaches, including the testing of MHT, CIM, CDT, CarbAcineto NP, and boronic acid discs, have been applied. The advantages of phenotypic carbapenemase detection are low cost, simplicity of operation, and the absence of specialised or expensive equipment; yet, it suffers from poor specificity and sensitivity. As a result, PCR screening was adopted as the gold standard for determining the sensitivity of various phenotypic approaches for several genes responsible for carbapenem resistance, as well as some insertion sequences.

When phenotypic test findings were compared to carbapenemase molecular detection results, the sensitivity of MHT, CIM, CDT, CarbAcineto NP, imipenem, and meropenem boronic acid was 78.4, 68.9, 79.7, 95.9, 56.8 and 70.3 percent, respectively. In the CarbAcineto NP test, four isolates carrying blaOXA-51, blaOXA-23, and blaVIM, including isolate no. A81, which also contained blaOXA-58, produced a positive result in less than 15 minutes, which might be attributable to the enzyme activity in these isolates.

CarbAcineto NP has previously been shown to be highly sensitive in detecting carbapenemase in Acinetobacter spp. Despite the fact that only 21 isolates had positive allover tests, all nine isolates proven to be carrying NDM by PCR were also positive in MHT, CIM, and CarbAcineto NP. CDT, on the other hand, failed to detect NDM in one isolate: A85, and boronic acid disc test with imipenem and meropenem failed to detect NDM in two isolates, respectively: A59 and A81 and A40 and A81. It's worth noting that A81 was the sole isolate found to have blaOXA-58. When inserted sequences are present upstream of CHDL producing genes, they may boost the synthesis of -lactamases.

Conclusions

A combination of phenotypic tests, including MHT, CIM, CDT, and boronic acid disc tests, appears to be required for the conclusive detection of carbapenemases, with the exception of CarbAcineto NP, which demonstrated better sensitivity approaching PCR findings. NDM prevalence levels observed here are lower than previously reported from other regions of the country, implying that more screening of different

Egyptian governorates is required to ascertain the precise prevalence rate. Nonetheless, the incidence of OXA-23 and VIM remains significant.