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First description of Extended-Spectrum β-lactamases and OXA-48 carbapenemase in Enterobacteriaceae isolates in Brazzaville, Congo

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Background:

To characterize genotypically Extended-spetrum-beta-lactamase (ESBL) and OXA-48 carbapenemases producing Enterobacteriaceae especially Klebsiella, Enterobacter, Serratia (KES) and Citrobacter species in portage and infection processes at the Brazzaville Hospital Center.

Methods:

The study was carried out for 7 months. Clinical samples (urine, pus and blood cultures) were collected from inpatients and outpatients at the Brazzaville University Hospital. Strains were identified by API20E and confirmed by MALDI-TOF.

Antibiotics susceptiibility testing was performed on isolated strains by diffusion method on MH agar plates. ESBL and OXA-48 phenotypes were identified according to the CA-SFM synergy technique and by a decrease in inhibition diameter around the Ertapenem disk and confirmed by PCR and sequencing. MLST K. pneumoniae genotyping of OXA-48 strains was performed.

Results:

Thirty-four no duplicate Enterobacteria strains were isolated from thirty-four patients, of which 12/34 (35.29%) were from outpatients and 22/34 (64.70%) from internal patients.

Except for imipenem, colistin; the amykacine and fosfomycin, tested antibiotics show high resistance too much of the beta-lactam, as well as a resistance very frequent aminoglycosides, to sulfamides, tetracyclines and Fluoroquinolones.
PCR revealed that 30/34 (88.24%) produced ESBLs, of which 2 strains harbors both ESBL and OXA-48 enzymes. blaSHV gene was the most common ESBL gene detected with 20/30 (66.67%), blaCTX-M was detected in 14 isolates (60.87%), blaTEM 15/30 (50%), blaOXA-48 2/30 (6.67%), blaCTX-M-9 1/30 (3.33%). 70% of the isolates (n=24) were isolated from urinesamples.

Sequencing of the amplification products revealed that the blaCTX-M1 strains were all CTX-M15; 13 variant enzymes were detected for blaSHV. Four types for TEM. Both strains OXA-48 were OXA-181 non-plasmid-borne and CTX-M-9 was CTX-M-27. These strains were resistant to gentamycin and fluoroquinolone. MLST K. pneumoniae OXA-48 showed two different standard sequences known in the ST464 and ST15 literature.

Note: - This Work Is Partly Presented at EURO Microbiology 2021 on August 19-20, 2021. Berlin Germany.

Conclusion:

We report here for the first time in Congo Brazzaville, the presence of β-lactamase genes including blaTEM, blaSHV, blaCTX-M and blaOXA-48 genes at disturbing frequencies within Enterobacteriaceae strains at the Brazzaville University Hospital. It proves the need to promote an infection prevention program with antibiotic regulation in hospitals in Congo Brazzaville.

Keywords:

Enterobacteriaceae, antibiotic resistance ESBL, OXA-48, MLST, CHU, Brazzaville.

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