

## Molecular epidemiology of carbapenem resistant acinetobacter baumannii isolated from khartoum state, Sudan

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### Abstract

*Acinetobacter baumannii* has emerged as an important multi-drug resistant organism that is associated with nosocomial infections worldwide. This study aimed to explore the molecular epidemiology and antimicrobial resistance mechanisms using whole-genome sequencing (WGS) of carbapenem resistant *A. baumannii* (CRAb) isolated from patients at Khartoum State, Sudan. Twenty two non-duplicate CRAb were collected between October 2016 and February 2017, from a variety of clinical specimens obtained from patients in two Hospitals at Khartoum State. Species identification and carbapenem resistance mechanisms were investigated initially using phenotypic and PCR detection methods using different multiplex PCRs for *gyrB*, OXA group (OXA-23, -40, -51, -58, -143 and -235), and in-house multiplex PCRs to detect genes encoding NDM, IMP, VIM, GIM, KPC and GES. The isolates were further characterized by WGS (Illumina MiSeq), and the molecular epidemiological characters and resistance mechanisms were identified. All isolates were phenotypically carbapenem-resistant and harboured several  $\beta$ -lactamase genes. The gene encoding the acquired OXA-23 was detected in 21/22 (95%) of the isolates, three of which co-harboured OXA-58. Other carbapenemases detected were: NDM-1 4/22 (18%) and GES-11 2/22 (9%). TEM-1D was detected in 20/22 (90%) isolates. One isolate had ISAbal upstream of blaOXA-51, as well as genes encoding OXA-1 and CTX-M-15. Furthermore many other acquired resistance genes were detected conferring resistance to aminoglycosides, macrolides, fluoroquinolones, phenicols, tetracyclines, sulphonamides, and trimethoprim. 19/22 (86%) of the isolates clustered with IC2 and had the intrinsic blaOXA-66. Two isolates clustered with different ICs harboured the intrinsic OXA genes: IC1 with blaOXA-69, and IC5 with blaOXA-91. The sporadic isolate had blaOXA-51. Molecular typing based on cgMLST revealed two transmission clusters containing isolates from two hospitals, with 12, and 3 isolates. In conclusion, our CRAb isolates mainly belonged to IC2 and constitute a prominent problem in our local setting. The OXA-23 producing isolates frequently possess other resistance genes coding for NDM-1, GES-11 and OXA-58. For prevention, screening, surveillance and infection control must be enhanced.

## Biography

Hana Elbadawi has completed her PhD at the age of 32 years from University of Khartoum and postdoctoral studies from Institute of Endemic Diseases, University of Khartoum. She is the molecular microbiologist at Soba University Hospital and international staff with MSF- France. Her research interest on antimicrobial resistance, bacterial genomics and infection prevention control. She has experience on studying phenotypic and genotypic resistance mechanisms and molecular epidemiology of Gram negative bacteria, a strong research, scientific background and scientific righting with nine years' experience working in research, academic and lab setting and prereview articles.



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