

Urban pigeons as a reservoir of carbapenem resistant Enterobacterales: first report of OXA-48-producing *Klebsiella pneumoniae*

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The emergence and dissemination of carbapenemase-producing Enterobacterales have already been described worldwide. OXA-48 is a class D carbapenem-hydrolyzing β -lactamase that was first identified in a clinical *Klebsiella pneumoniae* isolate in Istanbul, Turkey in 2001. After this report, this enzyme has received increased attention, particularly in hospital setting [1]. The presence of multidrug-resistant isolates in wildlife, which have never been directly exposed to antibiotics, has been reported in different geographical areas worldwide [2]. This suggested the possible interspecies transmission between humans, environment, domestic animals and wildlife. Among this later, pigeons can be considered as good indicator of the distribution of antibiotic

resistance in the environment and as an excellent choice for monitoring urban ecosystems [2,3]. Pigeons (*Columba livia*) are birds that live in close proximity to humans, particularly in public parks, on rooftops and near catering establishments [4]. Hence, they may play a major role in the transmission of pathogenic and antibiotic-resistant bacterial strains to humans and the environment via their feces. Therefore, the aim of the present study was to screen for the presence of carbapenemase-producing Enterobacterales strains in feces samples from urban pigeons in Batna city, Algeria.

Between May and June 2018, a total of 130 samples of fresh pigeon fecal droppings were collected from a public park (n = 100) and in the outside area of two hospitals including: Batna public hospital (n = 24) and Batna university hospital (n = 6), eastern Algeria. Samples were aseptically collected in sterile containers, and were immediately transferred to the laboratory for analysis at 4°C. The screening for carbapenem-resistant Enterobacterales began with a selective enrichment step in brain-heart infusion broth supplemented with vancomycin (64 μ g/ml) and ertapenem (2 μ g/ml). After overnight incubation at 37°C, 100 μ l aliquots from each enrichment tube were streaked on selective MacConkey agar plates supplemented with the same antibiotics. The representative colonies were identified using Matrix-Assisted Laser Desorption–Ionization Time-of-Flight Mass Spectrometry [5]. Susceptibility testing was performed by the disk-diffusion assay. Carbapenemases, extended-spectrum β -lactamases and aminoglycoside resistance determinants were searched for by real-time PCR, standard PCR and sequencing. The clonality relationships of the obtained isolates were investigated by multilocus sequence typing whereas; the transferability of the detected carbapenemase-encoding genes was verified by conjugation experiments. One carbapenem-resistant *K. pneumoniae* isolate from feces sample of pigeon collected in the outside area of Batna university hospital was obtained. This isolate was resistant to amoxicillin, amoxicillin-clavulanic acid, cefotaxime, ceftazidime, cefepime, aztreonam, ertapenem, tobramycin, gentamicin and ciprofloxacin, while being intermediate to ceftiofur and susceptible to imipenem. Molecular analysis showed that the obtained isolate carried the *bla*_{OXA-48} carbapenemase-encoding gene as well as *bla*_{CTX-M-15}, *bla*_{SHV-11}, *bla*_{TEM-1-D} and *aac(6′)-Ib* genes and belonged to the ST834. Moreover, the detected *bla*_{OXA-48} gene was transferable by conjugation. The detection of multi-drug resistant Enterobacterales strains in this bird species could be explained by their eating habits, as they can acquire antibiotic resistance through water and/or food contaminated with human feces, farm waste and pharmaceutical products, particularly antibiotics [6,7]. In conclusion, this study reports for the first time the isolation of OXA-48-producing *K. pneumoniae* from pigeons.

Conflicts of interest

None to declare.

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