

TITLE: Quinolone and beta-lactam resistance genes in *Escherichia coli* from fish (*Arapaima gigas*) in the Amazon Forest region

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ABSTRACT:

The spread of antimicrobial resistance is closely related to the consumption of food of animal origin, including fish and other marine and freshwater animal species. This study aimed to investigate the resistance profile in *Escherichia coli* isolated from intestinal contents of wild and captive *Arapaima gigas*, captured in the Brazilian Amazon region, state of Amapá. Forty specimens of *A. gigas* were used, twenty fish from farms and twenty from the wild environment. Through a selective pre-enrichment, a total of thirty-four colonies were isolated and identified as *E. coli*. The virulence genes *eaeA*, *lt*, *st*, *stx1*, *stx*, *eaeA*, *ial*, and *eagg* were tested by multiplex PCR, for the detection of virulence profiles. Genotyping of isolates was performed using multilocus sequence typing (MLST). We observed a high frequency of resistance to third and fourth generation cephalosporins, as ceftriaxone, cefoxitin, cefuroxime, cefepime, ceftazidime and cefepime. All isolates harboring blaCTX-M gene presented at least one known mutation in the *gyrA*, *gyrB* and *parC* genes. The frequency of resistance genes among isolates of captive pirarucus was: *gyrB*, *gyrA*, *parC*, *blaCTX-M*, *qnrA*, *qnrB*, and among wild pirarucus was: *gyrB*, *gyrA*, and *blaCTX-M*. The *qnr* genes and mutations in *parC* subunit were not detected in strains isolated from wild pirarucus. Only the Enterotoxigenic *E. coli* pathotype (ETEC). MLST analyses revealed the presence of eleven different patterns of sequence type. The most frequent sequence typing was ST7973 (23.4%). Incidence of beta-lactam-resistant Enterobacteriaceae in aquatic organisms (shrimp and fish) observed in the present study may be related to the indiscriminate use of antibacterial drugs in the culture. The *qnr* and *blaCTX-M* genes were previously reported in other research conducted in Brazil on *E. coli* isolated from clinical specimens. Furthermore, enterobacteria producing extended spectrum lactamases (ESBL) represent a significant role in health infections, increasing hospitalization time, morbidity, and mortality rates. Our results show the existence of quinolone and beta-lactam resistance in commensal *E. coli* from fish in Amazonian environment in remote communities with minimal exposure to antimicrobials, which brings critical attention to this problem that can reflect in the human health.

Keywords: Amazonian. Enterobacteria. Environmental resistance. Genotyping.

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