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## Detection of Extended-Spectrum $\beta$ -Lactamase-producing Bacteria in Fish Ponds

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### ABSTRACT

The widespread use of antibiotics in animal sector has aggravated the dissemination of Extended-Spectrum  $\beta$ -lactamases (ESBLs) that hydrolyses the  $\beta$ -lactam antibiotics. However, in recent literature, multidrug resistant ESBL-producing Gram-negative bacteria from fish pond water have not been extensively reported. Hence, this study was designed to determine the incidence of ESBL-producing Multi-Drug Resistant (MDR) Gram-negative bacteria from fish pond water in Ibadan. Fish pond water samples (n = 72) were collected from three fish ponds in Ibadan conurbation and analysed for isolation of Gram-negative bacteria using conventional methods. Antimicrobial susceptibility testing was performed using Kirby-Bauer disc diffusion. Phenotypic detection of ESBL was carried out using double disc synergy test while the ESBL genes (blaSHV, blaCTX-M and blaTEM) were identified by Polymerase Chain Reaction (PCR). The multi-drug resistant/ESBL-positive isolates were identified using 16S rRNA sequencing. A total of 82 bacteria isolates that comprised of 52 (63.4%) *Pseudomonas* species, 24 (29.3%) *Plesiomonas* species and 6 (7.3%) *Morganella* species were obtained from the fish pond. Forty-four (84.6%) *Pseudomonas* spp., 22 (91.7%) *Plesiomonas* spp. and 6 (100%) *Morganella* spp. resisted ceftazidime while 24 (46.2%) *Pseudomonas* spp., 11 (45.8%) *Plesiomonas* spp. and 4 (66.7%) *Morganella* spp. were resistant to trimethoprim/sulfamethoxazole. *Pseudomonas* spp. (n = 3), *Morganella* spp. (n = 1) and *Plesiomonas* spp. were multi-drug resistant. Out of the five isolates that were MDR, only *Morganella* spp. (n = 1) harboured the blaSHV and blaCTX-M ESBL genes. The detection of multi-drug resistant and extended spectrum  $\beta$ -lactamase Gram-negative bacteria from fish pond water showed that the aquacultural settings could constitute threat to public health.

**Keywords:** Extended-Spectrum  $\beta$ -Lactamases, Antimicrobial Resistance, Enterobacteriaceae, Fish ponds

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