

Phenotypic and molecular characterization of multidrug-resistant extended-spectrum beta-lactamase-producing *Salmonella* prevalent in raw chicken meat vended in Nigerian markets

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Abstract. In Nigeria, there is still a scarcity of data on the recovery of multidrug-resistant ESBL-producing *Salmonella* in chicken meat. Hence this study characterized the probable multidrug-resistant extended-spectrum beta-lactamase-producing *Salmonella* prevalent in chilled raw chicken meat vended in Nigerian markets. Detection of *Salmonella* was performed by meat rinse centrifugation-plating technique. Presumptive *Salmonella* colonies were identified by phenotypic and 16S rRNA gene sequencing. The confirmed *Salmonella* isolates were tested for multidrug resistance by the Kirby Bauer disc diffusion test. Detection and confirmation of extended-spectrum beta-lactamase (ESBL) phenotypes were performed by double disc synergy and combination disc tests. PCR and DNA sequencing of the ESBL-encoding genes (*bla*_{SHV}, *bla*_{TEM}, and *bla*_{CTX-M}) were also performed. The conserved and three-dimensional (3D) domains in ESBLs were respectively characterized by the reverse position-specific BLAST (RPS-BLAST) and Cn3D modeling tool. Of the 229 presumptive *Salmonella* isolates examined, 52 isolates were confirmed as *Salmonella* species, 46 isolates were multidrug-resistant and 41 isolates confirmed as multidrug-resistant ESBL-producing *Salmonella* species. The main serotypes were *Salmonella enterica* subsp. *enterica* serovar Typhimurium (35/52; 67.31%) and *Salmonella enterica* subsp. *enterica* serovar Enteritidis (17/52; 32.69%). Overall, the prevalence of chilled raw chicken meat contaminated with *Salmonella* was estimated at 0.17 (40/240). This value of prevalence exceeded the limits (≤ 0.1) set by the Meat Industry Guide, United Kingdom. All CTX-M, TEM, and SHV beta-lactamases produced by the *Salmonella* isolates were confirmed by RPS-BLAST and Cn3D modeling tool as serine-based hydrolases that consisted of two 3D domains with unique ligands such as sodium ion, formic acid, and glycerol. This study showed that multidrug-resistant ESBL-producing *Salmonella* was widespread in raw chicken meat vended in Nigerian markets. Thus, there is a need for relevant regulatory agencies to enforce safety.

Keywords: *Salmonella*; multidrug-resistant; extended-spectrum beta-lactamase; RPS-BLAST; Cn3D modeling tool.

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