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Commentary

Assessment of Antimicrobial Resistance in Foodborne Pathogens Isolated from Poultry Products

Lucas Henrique Silva*

Department of Veterinary Microbiology, Federal Institute for Food Safety and Public Health, São Paulo, Brazil

DESCRIPTION

The global rise in antimicrobial resistance (AMR) poses a major threat to both human and animal health, with foodborne pathogens playing a significant role in the transmission of resistant bacteria through the food chain. Poultry products, which are among the most widely consumed sources of animal protein in Brazil, serve as potential reservoirs for resistant microorganisms. This study investigates the prevalence and resistance profiles of key foodborne pathogens isolated from poultry products available in retail markets across São Paulo, aiming to provide a better understanding of the AMR burden associated with poultry consumption.

A total of 150 samples, including raw chicken meat, chicken liver, and processed poultry products such as nuggets and sausages, were collected from supermarkets, local butcher shops, and open-air markets over a six-month period. Samples were examined for the presence of Salmonella spp., Campylobacter jejuni, and Escherichia coli using standard ISO microbiological methods. Isolates were subjected to antimicrobial susceptibility testing against a panel of antibiotics commonly used in veterinary and human medicine, including tetracycline, ciprofloxacin, ampicillin, cefotaxime, gentamicin and colistin.

Results revealed that 60% of the samples tested positive for at least one of the target pathogens. E. coli was the most frequently isolated organism, detected in 44% of the samples, followed by Salmonella spp. in 29%, and Campylobacter jejuni in 18%. Alarmingly, a high percentage of isolates showed resistance to multiple antibiotics. Among E. coli isolates, 76% were resistant to tetracycline, 68% to ampicillin, and 41% to cefotaxime, indicating the widespread occurrence of Extended-Spectrum Beta-Lactamase (ESBL) producing strains. Salmonella isolates showed significant resistance to fluoroquinolones (56%) and gentamicin (37%), while Campylobacter jejuni exhibited 62% resistance to ciprofloxacin and 47% to erythromycin, compromising the efficacy of first-line treatments for campylobacteriosis.

Multidrug resistance (MDR), defined as resistance to three or more classes of antimicrobials, was observed in 64% of E. coli isolates and 48% of Salmonella isolates. Molecular characterization of MDR isolates revealed the presence of resistance genes such as blaCTX-M, tetA, qnrS, and mcr-1, further confirming the genetic basis for the resistance phenotypes. The detection of mcr-1, associated with colistin resistance, in three E. coli strains is particularly concerning, given that colistin is considered a last-resort antibiotic in human medicine.

The study also examined the potential sources of AMR emergence by conducting interviews with poultry producers and veterinarians in the region. Findings indicated widespread use of antibiotics not only for therapeutic purposes but also for growth promotion and disease prevention in poultry farms, often without adequate veterinary supervision. Many farms relied on over the counter antimicrobials, and only a minority adhered to proper withdrawal periods before slaughter. Such practices likely contribute to the selection and dissemination of resistant bacteria in the poultry production chain.

The public health implications of these findings are significant. Contaminated poultry products can serve as vehicles for the transmission of AMR pathogens to consumers, either through direct consumption or cross-contamination during food preparation. Infections caused by resistant bacteria can lead to prolonged illness, increased hospitalization rates, and higher healthcare costs. Furthermore, the presence of resistance genes in zoonotic pathogens raises concerns about horizontal gene transfer to human-adapted bacteria, exacerbating the AMR crisis.

In conclusion, this study demonstrates a high prevalence of antimicrobial-resistant foodborne pathogens in poultry products available in retail markets across São Paulo, Brazil. The presence of multidrug-resistant strains, including those harboring critical resistance genes like mcr-1, underscores the urgent need for comprehensive interventions. These should include stricter regulation of antimicrobial use in animal agriculture, enhanced surveillance of AMR in food systems, and public awareness campaigns on responsible antibiotic usage. Strengthening the

Correspondence to: Department of Veterinary Microbiology, Federal Institute for Food Safety and Public Health, São Paulo, Brazil, E-mail: lucas.silva@ifvsph-brazil.org

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One Health approach linking human, animal, and environmental health will be essential in mitigating the risks posed by antimicrobial resistance and ensuring the long-term safety of the food supply.