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ÁREA DO TRABALHO: MICROBIOLOGIA DE ALIMENTOS - 1st FoodMicro Latino

TÍTULO DO TRABALHO: Colistin Resistance In Escherichia Coli Isolated From The Poultry Production Chain

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RESUMO:

Escherichia coli is a Gram-negative bacterium from the Enterobacteriaceae family that commonly inhabits the gastrointestinal tract of humans and warm-blooded animals as a commensal microorganism. However, certain strains can be pathogenic, causing severe infections such as gastroenteritis, urinary tract infections, and sepsis. Colistin, a polymyxin-class antibiotic, has been used as a last-resort treatment for infections caused by multidrug-resistant bacteria in humans, despite its known toxicity. It was widely used in livestock production as a growth promoter, but with the increasing concern over antimicrobial resistance (AMR), its use in animal production has been banned in many countries. The discovery of the plasmid-mediated mcr-1 gene in 2016 raised global concern, as plasmids facilitate the horizontal transfer of this gene among different bacterial species, intensifying the threat of AMR dissemination. In this context, the present study aimed to isolate E. coli from different sources within the poultry production chain (meat, poultry litter, soil, and water) in the state of Santa Catarina, Brazil, and to determine the prevalence of the mcr-1 gene in colistin-resistant isolates. Among 90 isolates, 46% (41/90) were considered resistant (meat: 12/20; litter: 9/40; soil: 10/15; water: 10/15), based on colistin broth elution tests using concentrations of 1 µg/mL, 2 µg/mL, and 4 µg/mL. Samples that showed growth at concentrations ≥2 µg/mL were classified as resistant. These resistant isolates were then subjected to Polymerase Chain Reaction (PCR) for mcr-1 gene detection, in order to differentiate plasmid-mediated from chromosomal resistance. PCR detected the presence of the mcr-1 gene in two meat isolates, indicating a prevalence of 4.9% among the 41 resistant isolates. The findings of this study highlight the presence of the mcr-1 gene in E. coli strains isolated from the poultry production chain, emphasizing the growing concern over colistin resistance in agricultural environments. E. coli is the bacterial species most frequently associated with colistin resistance, with studies reporting a 13% prevalence in Brazil—contrasting with the 4.1% found in the present study. These results are particularly worrisome considering that mcr-1 is plasmid-mediated, enabling the horizontal transfer of resistance genes across different strains and bacterial species. This genetic mobility not only accelerates the spread of resistance

in animal production systems but also contributes to environmental dissemination through feces, wastewater, and contaminated soils. Therefore, plasmids play a pivotal role in the global expansion of AMR, further complicating infection control and undermining the efficacy of critical antimicrobials in both human and animal health. Continuous surveillance of AMR and the implementation of strategies to curb the indiscriminate use of critically important antibiotics are essential.

Keywords: antimicrobial resistance, mcr-1, colistin, Escherichia coli, poultry production chain.

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