

ANTIMICROBIAL RESISTANCE IN SHIGA TOXIN-PRODUCING *Escherichia coli* ISOLATES FROM PORK IN SOUTHERN BRAZIL

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According to the Brazilian Institute of Geography and Statistics (IBGE), 14.07 million pigs were slaughtered in the second semester of 2022 in Brazil, with the southern region responsible for more than 60% of this production. In terms of consumption, pork is the third most consumed in the country, behind chicken and beef. In addition, due to the intrinsic characteristics of pork, such as high-water activity and pH around 5.6, the presence and multiplication of microorganisms, becomes auspicious when under favorable conditions. *Escherichia coli* is a Gram-negative bacterium naturally found in the gut microbiota of people and animals, however some strains are considered pathogenic causing various symptoms, such as abdominal pain, bloody diarrhea and vomiting. The infection occurs by ingestion of contaminated food and water, also very young children and the elderly are more likely to develop severe symptoms, but even healthy adults can become seriously ill. According to the Ministry of Health, *Escherichia coli* is the etiological agent most incriminated in food outbreaks in Brazil, between 2012 and 2021. Among the pathotypes involved in foodborne disease, Shiga toxin-producing *Escherichia coli* (STEC) infections have been associated with clinical illness ranging from mild non bloody diarrhea to Hemolytic Uremic Syndrome, Hemorrhagic Colitis and Thrombotic Thrombocytopenic Purpura, which clinical condition can be fatal. Antimicrobial resistance in potential zoonotic pathogens has been a growing worldwide concern. Although human diarrheagenic *E. coli* infections are usually self-limiting, persistent diarrhea might require antimicrobial therapy. The indiscriminate use of antimicrobials by human population and in veterinary medicine as treatment or growth promoting agent could be responsible for emergency of resistant strains. Thus, the aim of this study was to evaluate the phenotypic antimicrobial resistance profile in Shiga toxin-producing *Escherichia coli* isolates from pork. Twenty-five isolates from pork hearts and cuts collected from the industries were tested for antimicrobial susceptibility against eight different antimicrobial agents. The isolates were previously identified as STEC using the 3M MDS[®] method, based on the Loop-Mediated Isothermal DNA Amplification - LAMP. The agar disc diffusion method was performed and evaluated according to the specifications of the Clinical and Laboratory Standard Institute (CLSI). The following discs were used: ampicillin (10 µg), ciprofloxacin (5 µg), chloramphenicol (30 µg), streptomycin (10 µg), sulfonamide (250-300 µg), trimethoprim (5 µg), imipenem (10 µg), gentamicin (10 µg) and nalidixic acid (30 µg). *Escherichia coli* ATCC 25922 was used as reference strain for quality control purposes. The isolates were classified as resistant, intermediate or susceptible. Antimicrobial multi-resistance was defined as resistance to three or more classes of antimicrobials. Of the 25 STEC isolates included in this study, all showed resistance to at least one antimicrobial agent. Resistance occurred most frequently to ampicillin (60%, n=15), sulfonamide (32%, n=8), chloramphenicol (16%, n=4), trimethoprim (16%, n=4), and nalidixic acid (12%, n=3). Furthermore, twelve isolates showed intermediate resistance profiles to chloramphenicol (28%, n=7) or streptomycin (10%, n=5). All isolates tested were susceptible to imipenem and a low frequency of resistance to ciprofloxacin (4%, n=1), gentamicin (4%, n=1), and streptomycin (4%, n=1) was observed. Among STEC isolates, resistance to more than one antimicrobial agent was observed in 40% (n=10) of the isolates and multi-resistance in 16% (n=4). Antimicrobial resistance in STEC isolates has also been reported among samples of

intestinal contents from pigs with diarrhea and fecal samples from pigs. The authors reported most common resistance to amoxicillin, ampicillin and kanamycin in all of the 53 isolates. The presence of STEC isolate from ovine origin in Southeastern Brazil with multi-resistance profile was reported. The isolate showed resistance to ampicillin, ampicillin/sulbactam and cefazolin. Additionally, the authors could detect the *bla_{CMY}* gene by PCR, responsible for antimicrobial resistance to β -lactams, as well as mutations in the Quinolone Resistance Determinant Region (QRDR), configuring fluoroquinolone-resistance profile. In conclusion, STEC isolates from pork in Southern Brazil displayed a high frequency of resistance to most antimicrobial agents tested. These results indicate that pork may pose a potential risk in serving as reservoirs of multi-resistant STEC isolates.

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Palavras-chave: STEC, swine, foodborne disease.