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**B-Lactam and Multi-Drug Resistance Profiling of *Salmonella* spp. and *Shigella* spp. Isolated from the Transitional Zone of the Kelani River, Sri Lanka**

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**Abstract**

*Salmonella* spp. and *Shigella* spp. are significant enteric pathogens responsible for gastrointestinal infections, and the emergence of antibiotic-resistant strains increasingly compromises treatment efficacy. This study evaluated the  $\beta$ -lactam and multidrug resistance profiles of *Salmonella* and *Shigella* isolates from the transitional zone of the Kelani River Basin, a key freshwater resource in Sri Lanka. 27 surface and groundwater samples were collected during the first inter-monsoon season of 2024. Isolation was performed using the standard pour plate method, and bacterial identification was confirmed with five standard biochemical tests. Resistance to three commonly used  $\beta$ -lactam antibiotics amoxicillin (AMOX), ampicillin (AMP), and cloxacillin (CLOX) was assessed by determining Minimum Inhibitory Concentration (MIC) values. The Multiple Antibiotic Resistance (MAR) index was calculated to estimate the extent of multidrug resistance among isolates. Results showed that CLOX exhibited the highest resistance, with 46.9% of isolates resistant at 60  $\mu\text{g/mL}$  and 61.3% at 360  $\mu\text{g/mL}$ . AMX resistance was observed in 28.6% (60  $\mu\text{g/mL}$ ) and 32.4% (360  $\mu\text{g/mL}$ ) of isolates, while AMP resistance was observed in 24.5% (60  $\mu\text{g/mL}$ ) and 6.5% (360  $\mu\text{g/mL}$ ). MAR index values ranged from 0 to 1, with 17.2% of isolates exhibiting no resistance and 37.9% resistant to all three  $\beta$ -lactam antibiotics. The elevated MICs and high MAR indices indicate strong selective pressure and widespread antibiotic resistance in this freshwater environment. These findings highlight the urgent need for continuous environmental surveillance and the implementation of strict policy measures to prevent the dissemination of clinically relevant Antibiotic Resistance Genes (ARGs) in the Kelani River Basin.

**Keywords:** *Antibiotic resistance, Salmonella spp., Shigella spp., MIC value, MAR Index*