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21849 | Assessment of antimicrobial resistance in Gram-negative bacteria from rivers supplying drinking water: insights for water quality management

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Background & Aim: Antimicrobial resistance-AMR threats human-animal-environmental health and its presence in surface water system demands careful studies. Here we assessed the spread of AMR Gram-negative bacteria used in analysis of rivers supplying drinking water. **Methods**: Seventy-six samples (42-water/34-sediments; 6-rivers:A-F) were collected in Porto region (22-Winter/29-Spring/25-Summer). Standard methods were used for *Escherichia coli*-Ec+coliform counts and *Salmonella* detection. Ec phylogenetic groups-PhG and *Salmonella* serotypes were identified by PCR+WGS, susceptibility to antibiotics/biocides by disk diffusion or broth-microdilution (EUCAST/CLSI), antibiotic (bla_{ESBL})/metal tolerance-MeT genes (copper-*pcoD/silA/silE*; mercury-*merA*; arsenic-*arsB*) by PCR, and metals by ICP-MS. **Results**: Most samples had Ec (91%:2-13,000 CFU/100ml) and coliforms (100%:42-256,000 CFU/100ml), all below advisable values. *Salmonella* (n=60; diverse serotypes) was found in 20% of samples, varying among rivers (0-43%;$p<0.05$-Fisher), but not seasons ($p>0.05$). Rivers with *Salmonella* had Ec or *K.pneumoniae* producing extended-spectrum-beta-lactamases-ESBL. Multidrug-resistant-MDR Ec (33/133 isolates; diverse PhG) were similar in all samples (40-60%;$p>0.05$). Resistance to ampicillin (29-50%), aminoglycosides (17-60%), cephalosporins (0-33%), ciprofloxacin (0-40%), chloramphenicol (0-29%), sulphonamides (8-29%), tetracycline (0-50%), and trimethoprim (10-50%) were similar ($p>0.05$) among rivers. MeT genes were found in few *Salmonella*+Ec samples (*sil±pco*:0-40%;*merA*:0-50%), supporting low metal concentrations found in water (Cu:0.27-1.94μg/L; As:0.78-15.6 μg/L; Hg:<0.048μg/L). Different species had BZC MIC/MBC ≤32mg/L (wild-type). **Conclusions**: This study shows the widespread of MDR bacteria, including *Salmonella* serotypes with clinical relevance and ESBL-producing Enterobacterales, in

rivers used for drinking water production, stressing the need for a robust water quality management.

Keywords: Water quality; Antimicrobial Resistance; Surface waters; Environment; Public health.

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