

Poster Communication 3

Untreated water as a reservoir of antibiotic-resistant *Escherichia coli*: assessing potential public health risks

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Abstract

Background: In rural and peri-urban settings, untreated water sources such as wells, boreholes, springs, and public fountains are frequently used for domestic and agricultural purposes [1]. The presence of *Escherichia coli* is a key indicator of fecal contamination and may reflect environmental reservoirs of antimicrobial resistance (AMR), posing potential public health risks [2]. **Objective:** To evaluate antimicrobial susceptibility patterns of *E. coli* isolated from untreated water sources and explore associated environmental and exposure-related factors. **Methods:** Within the WATER project (CESPU, WATER-GI2-CESPU-2025), 24 *E. coli* isolates obtained from 40 untreated water samples (wells, boreholes, fountains, and one spring) collected across four parishes in the municipality of Chaves (Northern Portugal) were tested against 10 antibiotics using the disk diffusion method (EUCAST/CLSI guidelines). Screening for extended-spectrum beta-lactamase (ESBL) production was performed using the double-disk synergy test [3]. Data on water use, the surrounding environment, and household characteristics were also collected. **Results:** Isolates exhibited high susceptibility, with no resistance detected to third-generation cephalosporins, carbapenems, fluoroquinolones, aminoglycosides, or trimethoprim-sulfamethoxazole. Resistance was most frequently observed for ampicillin (37.5%) and tetracycline (29.2%), while resistance to amoxicillin-clavulanic acid was low (4.2%). Overall, 62.5% of isolates were resistant to at least one antibiotic, whereas 37.5% were fully susceptible. No ESBL-producing or multidrug-resistant (MDR, resistance to ≥ 3 antimicrobial classes) isolates were identified. Environmental data indicated that positive water sources were commonly associated with small-scale agriculture and animal presence, and were used by households, including older individuals (>65 years). **Conclusions:** Untreated water sources may act as environmental reservoirs of *E. coli* with resistance to commonly used antibiotics, particularly ampicillin and tetracycline. The detection of resistant isolates in water sources used for human consumption, including by potentially vulnerable populations, highlights a possible route of exposure. These findings support the need for integrated monitoring of water quality, antimicrobial resistance, and environmental factors to better assess and mitigate public health risks.

Keywords: antimicrobial resistance; untreated water sources; One Health

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