

Prevalence of extended-spectrum beta-lactamase producing- and carbapenem-resistant *Enterobacterales* and methicillin-resistant *S. aureus* isolated from surface water in Southern Italy

G. Nobili¹, A. Cocomazzi², M. G. Basanisi³, G. La Bella^{2,3}, A. M. Damato¹, R. Coppola¹, R. Colangelo¹, T. Scirocco⁴, I. Franconieri⁵, A. Stallone⁵, M. Notarangelo⁵, R. Petruzzelli⁵, S. Pagliara⁵, A. Didonna¹, P. Selicato¹, S. Faleo¹, G. Occhiochiuso¹, L. Dattoli², E. Poppa¹, F. Tolve¹, V. Bortolaia⁶, G. La Salandra¹

¹IZSPB - Foggia (Italy), ²Azienda Sanitaria Locale della provincia di Foggia - Foggia (Italy), ³Università degli Studi di Foggia - Foggia (Italy), ⁴IRBIM CNR - Lesina (FG) (Italy), ⁵ARPA Puglia - Foggia (Italy), ⁶SSI - Copenhagen (Denmark)

BACKGROUND

The World Health Organization has developed a worldwide priority list of the most important antimicrobial-resistant bacteria (ARBs) (1). Detection of ARBs and antibiotic-resistance genes (ARGs) in the environment has recently received increasing interest due to the potential health risk posed by bacteria associated to animals or humans at the interface of wildlife and the anthropic world (2-3). The aim of this study was to evaluate the presence of extended-spectrum β -lactamase (ESBL) producing- and carbapenem-resistant *Enterobacterales* (CPE) and methicillin-resistant *S. aureus* (MRSA) in surface water samples.

METHODS

From May 2023 to April 2024, 64 surface water samples were collected from 6 rivers and 2 lakes in Apulia region (Fig. 1). MRSA was isolated according to the EURL AR protocol (4). For the isolation of CPE and ESBL, 100-ml water samples were filtered and incubated at 42°C for 24 h in Mossel broth and Buffered Peptone water, respectively. The enrichments were plated on CHROMagar mSuperCarba and CHROMagar ESBL plates and incubated at 42°C for 24 h. Subsequently, the isolated strains with a typical aspect were identified using MALDI-TOF MS (Bruker) and genotypically characterized by Real-Time PCR by Allplex EnterodR Assay kit (Seegene).



Fig. 1. Map of sampling of the Apulia Region

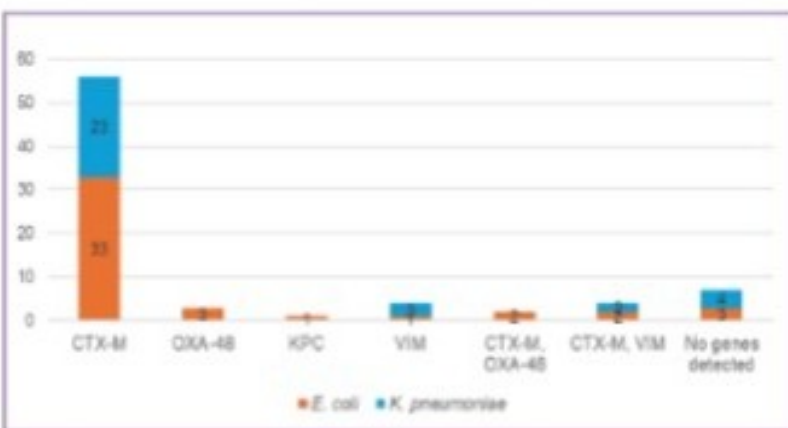


Fig. 2. Detection of resistance genes in *K. pneumoniae* and *E. coli* isolated from surface water

RESULTS

From 75% (48/64) of water samples (Fig. 1), 77 non-duplicate *Enterobacterales* strains were isolated (Fig. 2). The *bla*_{CTX-M} was the most prevalent gene identified (72,7%, 56/77), instead carbapenemase genes were detected in 18,2% (14/77) of all isolates (Fig. 2). MRSA were not isolated.

CONCLUSIONS

To the best of our knowledge, this represents the first study about MRSA and CTX-M-type ESBLs and VIM-, KPC- and OXA-48-type carbapenemases among *Enterobacterales* collected from the surface water in Apulia region. The dissemination of ESBL- and carbapenemase-producing *Enterobacterales* could be particularly worrisome, due to the ability of nosocomial pathogens to transfer ARGs among different hosts and environments. Further studies are needed to investigate the clonality and possible virulence characters and to evaluate a possible link with clinical isolates.

References

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