

## ESBL-Producing *E. coli* in Ready-to-Eat Stuffed Mussels

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### INTRODUCTION & AIM

ESBL-producing *E. coli* threatens global health and is a major threat to antibiotic-resistant bacteria. In Türkiye, ready-to-eat stuffed mussels, an important street delicacy, are generally sold in unhygienic environments. The possibility of cross-contamination is high in foods sold in unhygienic sales places. Therefore, Resistance to carbapenem, used in treating ESBL-producing bacteria, should be closely monitored. *Enterobacterales* resistant to third-generation cephalosporins and carbapenem are among the pathogenic bacteria that should be closely monitored (1). Mobilized genetic material plays a significant role in the spread of resistance mechanisms. Plasmids are key players in disseminating ESBL and carbapenem resistance genes, and plasmid-derived resistance genes are commonly found in *E. coli* (2). The objective of this study was to investigate the following: **a)** the prevalence of *E. coli*, **b)** the phenotypic detection of ESBL-producing and carbapenem-resistant *E. coli* isolates, and **c)** the presence of plasmid-derived ESBL and carbapenem resistance genes in raw mussels collected from various sales points in Istanbul, a metropolitan city.

### METHOD

#### 1) Sampling

In 2022, samples (ready-to-eat stuffed mussel) were collected from street vendors ( $n = 35$ ), kiosks ( $n = 35$ ), and restaurants ( $n = 30$ ) in for each side from Istanbul. In total, 200 samples were collected.

#### 2) Isolation of *E. coli* using conventional methods.

- Tryptone Bile Glucuronide (TBX)
- Eosin Methylene Blue (EMB)
- Tryptic Soy Agar (TSA)

#### 3) Verification of *E. coli* Isolates by PCR

- DNA extraction
- Confirmation of *E. coli* Isolates by PCR (16S rRNA; ECO1-2 primers )

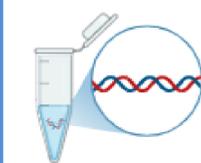
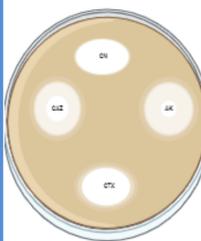
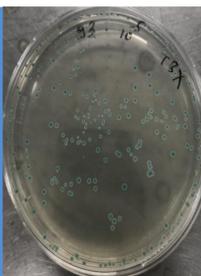
#### 4) Determination of antibiotic susceptibility of *E. coli* isolates

- Disc diffusion method cefotaxime (CTX), ceftazidime (CAZ), amoxicillin-clavulanic acid (AMC), meropenem (MEM), and ampicillin (AMP).

-The double disc synergy test (DDST)

-Detection of ESBL genes ( $bla_{SHV}$ ,  $bla_{TEM}$ ,  $bla_{CTX-M}$ , and  $bla_{OXA}$ ) by PCR

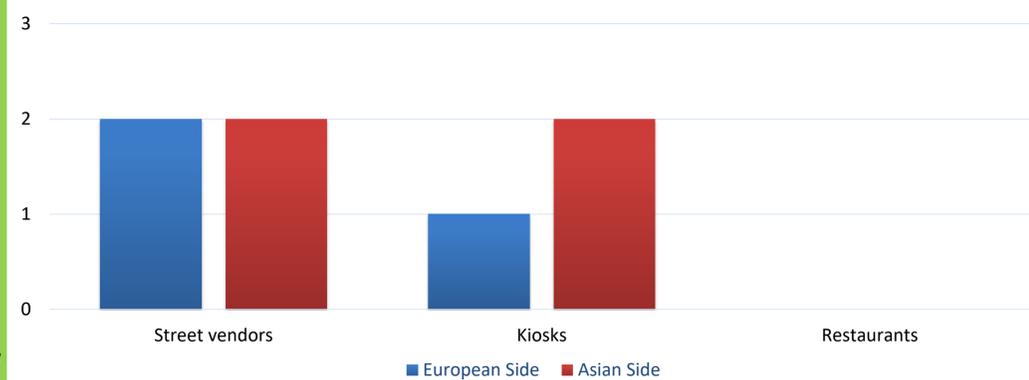
-Detection of carbapenemase resistance genes ( $bla_{NDM-1}$ ,  $bla_{OXA-48}$ ,  $bla_{VIM}$ , and  $bla_{KPC}$ ) by PCR



### RESULTS

- A total of (3.5%) 7 *E. coli* isolates were found in 200 ready-to-eat stuffed mussels in Istanbul.

**Table 1. *E. coli* prevalence from Asian and European side**



- All isolates were resistant to (100%) AMP, 85.7% were resistant to AMC and all isolates were susceptible to MEM, CTX, and CAZ.

- An ESBL-producing *E. coli* isolate was obtained from a sample collected at a kiosk on the Asian side. This isolate is resistant to the antibiotics AMP and AMC, and the DDST result was negative. PCR analysis confirmed the presence of the  $bla_{TEM}$  gene.

- Carbapenem resistance was not detected.

- For the first time, an ESBL-producing *E. coli* isolate was found in ready-to-eat stuffed mussels in Türkiye, which is located at the crossroads of Asia, Europe, and Africa.



### CONCLUSION

ESBL-producing *E. coli* detected in raw mussels ready for consumption threatens public health and is a clear example of how antibiotic resistance can be transmitted through food. Therefore, the global health system needs to embrace one health.

### REFERENCES

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2. Aydin, A., Suleymanoglu, A. A., Abdramanov, A., Paulsen, P., & Dumen, E. (2024). Detection of Extended Spectrum  $\beta$ -Lactamase-Producing Escherichia coli with Biofilm Formation from Chicken Meat in Istanbul. *Foods*, 13(7), 1122. <https://doi.org/10.3390/foods13071122>
3. Maps were obtained from <https://www.google.com/maps> and artificial images were obtained from app.biorender.com.