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Investigation of ESBL-Producing *Escherichia coli*, Antibiotic Resistance and Biofilm Formation Ability in Chicken Meat in Istanbul

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Multidrug Resistance

INTRODUCTION

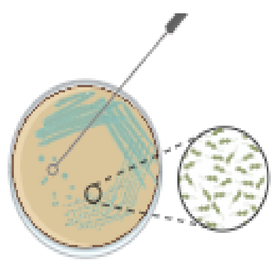
Antibiotic resistance is a serious public health threat that limits treatment methods, increases costs and may even cause deaths. Some antibiotic resistances and bacterial species stand out in antibiotic resistance. ESBL-producing *E. coli* is one of these threats. ESBL-producing *E. coli* can infect people through food and make treatment difficult. The fact that antibiotic-resistant bacteria produce multiple antibiotic resistance and produce biofilms that provide resistance to external conditions increases the seriousness of the situation (1). The last resort antibiotics carbapenem and colistin are used to treat bacteria with these properties. Especially the use of colistin, which has a nephrotoxic effect, as a treatment option again is an indication that MDR and ESBL production has reached an extremely concerns level (2). The aim of this study was to investigate the presence of *E. coli* and antibiotic resistance patterns in raw chicken meat.

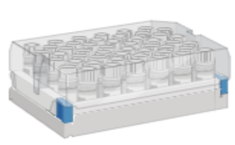
METHOD

- Collection of raw chicken meat samples from Asian and Europen sides of Istanbul
- Isolation of *E. coli* by conventional methods
- Purification of suspected isolates
- DNA isolation
- Measuring the quality of DNA isolation
- Verification of the presence of *E. coli* by PCR
- Determination of antibiotic susceptibility by disk diffusion method, double disk synergy test
- Investigation of antibiotic resistance genes by PCR;

ESBL genes (bla_{TEM}, bla_{CTX-M}, bla_{SHV} and bla_{OXA-2}); carbapenem resistance genes (bla_{VIM}, bla_{OXA-48}, bla_{NDM} and bla_{KPC}); mobilized colistin resistance genes (*mcr*-1, *mcr*-2, *mcr*-3, *mcr*-4, *mcr*-5, *mcr*-6, *mcr*-7, *mcr*-8)

- Investigation of biofilm production by microplate method





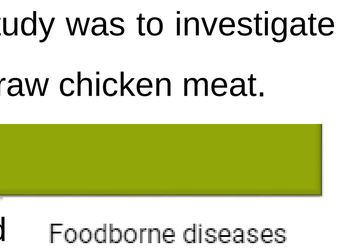
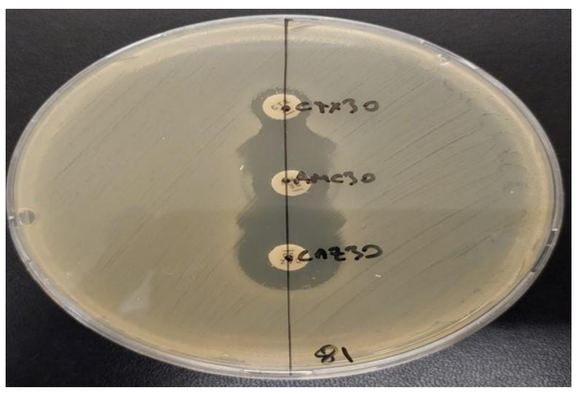
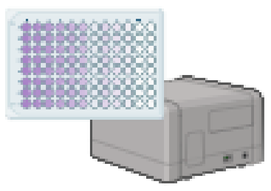


Figure 1. ESBL producing *E. coli* by DDST.





RESULTS

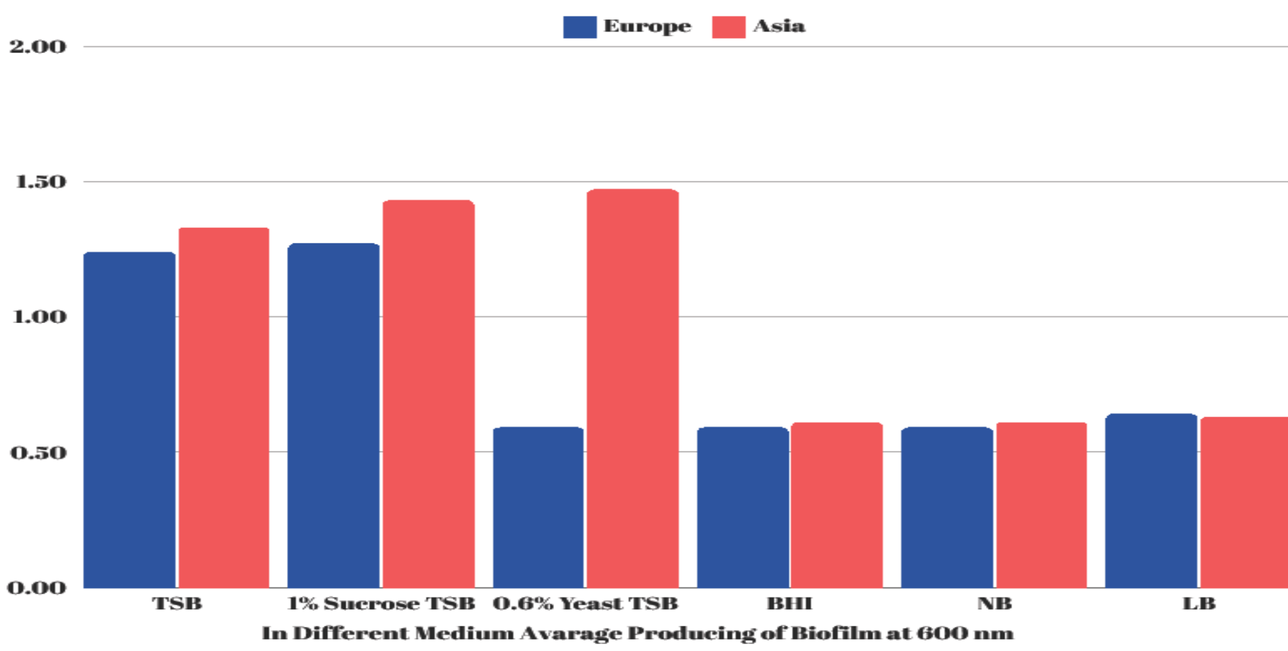
- 48.6% (101/208) *E. coli* was detected in raw chicken meat.

Table 1. Antibiotic resistance rates by European and Asian sides of Istanbul

	Antibiotic Resistance Rates (%) as CLSI (2021)					
Istanbul	Cefotaxime	Meropenem	Ampicillin	Amoxicillin clavulanic acid	Chloramphenicol	Tetracycline
Europe	41.3	53.4	82.7	62.06	51.7	74.1
Asia	27.9	9.3	72.09	74.4	69.7	74.4

- All isolates are susceptible to piperacillin-tazobactam and nitrofurantoin.
- 79.1% *E. coli* strains demonstrated MDR.
- 17.8% *E. coli* were phenotypically found to produce ESBL.
- bla_{TEM} (97.02%), bla_{CTX-M} (45.5%), bla_{SHV} (9.9%) and bla_{OXA-2} (0.9%) were detected
- Carbapenem and colistin resistance genes were not detected

Figure 2: Comparison of absorbance values in the measurement of biofilm ratios



CONCLUSION

Chicken meat can be an important source for the spread of ESBL-producing *E. coli* and is a carrier of plasmid-derived resistance genes and should be carefully monitored. High biofilm production, which is an important obstacle in safe food practices, threatens public health and additional measures need to be taken. Effective implementation of food hygiene practices is essential for public health. Adoption of a one-health concept will be effective in preventing the spread of foodborne antibiotic resistance.

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