Assessing and decreasing environmental contamination

STREET-VENDING FOODS: AN UNDERESTIMATED VEHICLE OF BACTERIA CARRYING VIRULENCE FACTORS AND ANTIBIOTIC RESISTANCE GENES

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Objectives: Street-vending food has grown exponentially worldwide, representing in some countries a significant proportion of the food consumed by the population. However, microbiological food safety hazards of vending units in industrialized countries are scarcely evaluated. The aim of this study was to analyze the microbiological quality and safety of street-vended foods as well as the hands hygiene of those vendors. Methods: We analysed samples of hot dogs (n=10), hamburgers (n=10) and hands of food handlers (n=9) from ten street vending units in Porto region. We screened for Salmonella, Listeria monocytogenes, Escherichia coli, Enterobacteriaceae, coliforms, coagulase-positive Staphylococcus and aerobic mesophilic counts (standard methods). The bioindicator E. coli was identified by API/MALDI-TOF/16S rDNA PCR and clonal relatedness by PCR for phylogenetic groups (PhG) and Pulsed Field Gel Electrophoresis (PFGE). Those isolates were characterized for antibiotic resistance by disk diffusion (CLSI/EUCAST) and ESBL expression by double disk synergy test. Antibiotic resistance genes (tetA/tetB/tetG, strA/strB/aaadA, dfrA1/dfrA7/dfrA12/dfrA14, sul1/sul2/sul3, catA/cmI/Am/floR, blaTEM/blaSHV/blaCTX-M-group, qnrA/qnrB/qnrC/qnrD/qnrS/qepA/aaac(6')-Ib-crr/oqxAB), class 1 integrons and virulence factors (EHEC: vtx1/vtx2/eeaeA; EPEC: bfpA/eeaeA; ETEC: estA/eltB/astA; EIEC: iai; EAEC: pCVD/astA) were searched by PCR/sequencing. Results: Salmonella and coagulase-positive Staphylococcus were absent, but L. monocytogenes was detected in 4 food samples (20%; 3 vending units). All food samples were unsatisfactory for Enterobacteriaceae and coliforms (>10³ UFC/g). E. coli was detected in 11 (55%) food samples of both types, with 4 (20%) from 4 units (40%) presenting unsatisfactory levels (≥10 UFC/g). The food handler’s carried Enterobacteriaceae and coliforms (100%), coagulase-positive Staphylococcus (44%) and/or E. coli (11%). E. coli isolates (n=30) detected in the food/vendors samples belonged to 3 PhG (A0-9, A1-8, B1-13) and 8 PFGE-types/clones, with 3 of them spread in different samples from the same vending unit and/or different units, pointing out for cross-contamination or common source of contamination. 33% (5 clones) presented resistance to different antibiotics (tetracycline-30%, tetA/tetB; ampicillin-23%, blaTEM; streptomycin-20%, strA-strB/aaadA; sulfamethoxazole-20%, sul1/sul2; chloramphenicol-20%, catA/catB3/floR, trimethoprim-13%, dfrA1; nalidixic acid-17%; ciprofloxacin-13%). Multidrug resistance (MDR) profiles were observed in 23% (n=7; 3 clones; food/vendor samples), including to the clinically relevant antibiotic ciprofloxacin in one clone/PhG B1 (food). Those strain carried a 3000 bp integron (intI1-aaeA4-catB3-dfrA1-sul1), tetB/blatEM/strA-strB/aaadA/sul2/catA but absence of plasmid-mediated quinolone resistance determinants and ESBL genes. Screening of intestinal pathogenic E. coli virulence factors found astA (vendor) or eeaA (food) genes in two MDR clones. Conclusions: Ready-to-eat street foods and food handlers analysed in this study had a poor microbiological quality and seems to be vehicles of pathogenic bacteria (L. monocytogenes) and/or E. coli carrying virulence/antibiotic resistance genes with potential clinical impact. Those data highlights the need to establish specific regulations/measures and training to improve food safety in the street food sector of industrialized countries.