

## **DETECTION OF A CARBAPENEM-RESISTANT KLEBSIELLA PNEUMONIAE STRAIN IN KITCHEN SPONGES.**

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### **INTRODUCTION**

Although research on foodborne diseases is well documented for certain micro-organisms, less research has been undertaken on cross-contamination with Enterobacteriaceae from food within the kitchen environment. In this study, we analysed the presence of *Klebsiella* spp. and *Raoultella* spp. and their antibiotic resistance in 100 used kitchen sponges. In a domestic environment, kitchen sponges are commonly used by consumers for doing the dishes and/or cleaning kitchen surfaces. Given their multi-purpose use, their often high humidity and the presence of organic residuals, they are considered a favourable habitat for various groups of micro-organisms and could serve as a vehicle in the transmission of foodborne pathogens.

### **METHODOLOGY**

A total of 100 kitchen sponges, alongside a questionnaire regarding hygienic parameters, were randomly collected from domestic environments and analysed within 24 hours after arrival in the lab. Kitchen sponges were immersed in 100 ml buffered peptone water, homogenised and incubated at 37°C for 24 h ± 2 h. Ten µl of this enrichment was plated on MacConkey agar and incubated at 37°C for 24 h ± 2 h. Presumptive *Klebsiella* spp. and *Raoultella* spp. were isolated and confirmed by MALDI-TOF MS. Antibiotic susceptibility testing (AST) was performed on all *Klebsiella* spp. and *Raoultella* spp. isolates following the EUCAST guidelines using EUVSEC 3 and EUVSEC 2 plates. Whole genome sequencing was performed using the Illumina platform.

### **RESULTS**

A total of 60 % of the kitchen sponges were positive for *Klebsiella* spp. or *Raoultella* spp and six sponges contained two different species. *Klebsiella oxytoca* was detected in 78.5 % of the positive samples, followed by *Klebsiella pneumoniae* (12.31 %), *Raoultella ornitholytica* (4.62 %), *Klebsiella variicola* (1.54 %), *Klebsiella aerogenes* (1.54 %) and *Raoultella planticola* (1.54 %). AST revealed the presence of one carbapenem-resistant isolate (ST26), with resistance to ertapenem and meropenem. Reduced susceptibility to carbapenems was caused by the presence of blaSHV-36 combined with porin deficiency (OmpK37).

## DISCUSSION

*Klebsiella* spp. can be part of the commensal flora of human intestines but are also considered to be opportunistic pathogens. *Klebsiella* spp. might present antimicrobial resistance, and carbapenem-resistant Enterobacteriaceae are included in the WHO global priority list of antibiotic-resistant bacteria.

Among the *Klebsiella* spp. isolates, *K. oxytoca* was the most prevalent species (52/57, 91.23 %) followed by *K. pneumoniae* (8/57, 14.04 %), as previously observed (Marotta et al.; Møretrø et al.; Osaili et al.). This high prevalence of *Klebsiella* spp. as well as the presence of a carbapenem-resistant isolate in kitchen sponges raise concern about the possible risks of foodborne diseases associated with this kitchen tool. These findings advocate for good hygienic measures within a household setting.