



FOOD SAFETY ASSESSMENT OF POKE BOWLS COMMERCIALIZED IN THE CAMPANIA REGION: PREVALENCE AND VIRULENCE PROFILE OF BACILLUS CEREUS

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Objective. Poke is a ready-to-eat (RTE) food whose consumption has markedly increased in recent years. This product may be particularly susceptible to microbial contamination due to its heterogeneous composition and extensive handling during preparation. Notably, the widespread use of cooked rice as a primary base ingredient significantly increases the risk of *Bacillus cereus* contamination. Therefore, this study aims to investigate the presence of *B. cereus* in poke bowls. In addition, since some strains may act merely as environmental contaminants and others carry virulence determinants associated with foodborne illness, the isolated strains were further analyzed to determine their virulence gene profiles for an accurate assessment of consumer risk.

Methods. A total of 74 poke bowls collected in the Campania Region were analyzed for the presence of *B. cereus*. The isolated strains were identified as *B. cereus* using endpoint PCR targeting the *nheB/C* gene. Subsequently, the confirmed strains were analyzed for other virulence-associated genes using endpoint PCR. Specifically, the following genetic targets were investigated: *cwpFM*, encoding a cell wall-associated peptidase implicated in bacterial adhesion and pathogenicity; *cytK*, encoding cytotoxin K; *hblD*, encoding one component of the hemolysin BL (hbl) enterotoxin complex; and *ces*, encoding cereulide synthetase, the enzyme responsible for the biosynthesis of the emetic toxin cereulide.

Results. Of the 74-poke bowls analyzed, 60 (81%) tested positive for *Bacillus cereus*. The molecular characterization of these isolates showed a high prevalence of several virulence determinants. The *cwpFM* gene was detected in

98.3% (59/60) of isolates, followed by *cytK* in 82.0% (49/60), *hblD* in 50.0% (30/60), and *ces* in 16.7% (10/60). Most isolates carried multiple virulence-associated genes, indicating the widespread presence of potentially pathogenic strains in the products investigated.

Conclusions. The high prevalence of *B. cereus* (81%) in the analyzed poke bowls confirms that these products represent a highly favorable niche for the survival and growth of this pathogen. The presence of virulence-associated genes in a significant proportion of the isolates highlights the relevant enterotoxigenic potential of the characterized strains. Specifically, the widespread distribution of strains carrying multiple virulence determinants confirms the relevance of *B. cereus* as a concrete public health and food safety concern to the consumption of poke bowls. The almost ubiquitous detection of the *cwpFM* gene (98.3%) is particularly noteworthy, as it suggests a strong capacity for biofilm formation and environmental persistence among these isolates. Regulation (EC) No 2073/2005 has not established specific microbiological criteria for *B. cereus* for ready-to-eat foods. However, food business operators are required to implement HACCP-based procedures in compliance with Reg. (EC) No 852/2004. Particular attention should be paid to maintaining appropriate temperature control throughout the entire production chain, as inadequate temperature management can promote *B. cereus* growth and its toxin production. In line with European food legislation, the implementation of regular official controls, validated sanitation procedures, storage, distribution, and retail should be strengthened to ensure effective risk control, regulatory compliance, and the protection of consumer health.