ID: 488

Tracking *Salmonella* in Sesame Foods: Genomic Diversity and Resistance Patterns

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Abstract

Sesame-based products such as tahini and halva have gained international popularity due to their nutritional benefits and cultural significance. However, their association with recent *Salmonella* outbreaks and recalls has raised global concerns regarding their microbiological safety. Despite low water activity traditionally limiting microbial growth, these products have demonstrated the ability to harbor *Salmonella* for extended periods, leading to recalls and international trade disruptions.

This study aimed to investigate the molecular epidemiology of *Salmonella* strains isolated from sesame, tahini, and halva. Genome assemblies were obtained from the NCBI database and filtered based on product metadata. Quality control assessments were performed using CheckM and QUAST to ensure high-quality genomes. Serotyping and core genome multilocus sequence typing (cgMLST) were conducted using SISTR, while resistance genes, virulence factors, and plasmid content were identified using Abricate and Bakcharak. Pangenome analysis was performed with Roary, and phylogenetic relationships were inferred using IQ-TREE with 1,000 bootstrap replicates.

The analysis revealed notable genomic diversity among the *Salmonella* isolates, with multiple serovars and cgMLST types identified across the three commodity groups. Several isolates carried clinically relevant antimicrobial resistance genes and virulence factors, including those linked to enhanced environmental persistence. Phylogenomic analysis showed both commodity-specific clustering and instances of inter-commodity genetic similarity, indicating potential shared contamination sources or cross-contamination events.

These findings underscore the importance of genomic surveillance in tracking the emergence and dissemination of foodborne pathogens in low-moisture foods. By applying molecular epidemiology approaches, this study contributes to the understanding of *Salmonella* diversity, resistance, and distribution in sesame-based products and highlights the need for proactive food safety strategies in international supply chains.