Antimicrobial resistance in food: A growing global concern.

Moutien Hudaa*

Department of Agriculture, University of Mauritius, Mauritius

Introduction

Antimicrobial resistance (AMR) is a pressing global health issue that transcends the boundaries of human and veterinary medicine, extending significantly into the realm of food microbiology. With the increasing use of antimicrobials in agriculture and food production, the emergence and spread of resistant microorganisms have become a critical concern. This phenomenon poses serious threats to public health, food safety, and economic stability. AMR arises when microorganisms such as bacteria, fungi, viruses, and parasites evolve to resist the effects of antimicrobial agents designed to kill them or inhibit their growth. In the context of food microbiology, the presence of resistant bacteria in food products not only endangers consumer health but also complicates infection management, potentially leading to longer hospital stays, higher medical costs, and increased mortality. One of the primary drivers of AMR in food is the widespread and often indiscriminate use of antimicrobials in livestock farming. These substances are employed to prevent disease, promote growth, and enhance feed efficiency in animals. However, their overuse and misuse have facilitated the selection and proliferation of resistant strains, which can be transferred to humans through the food chain [1, 2].

The food production environment itself can act as a reservoir for resistant microorganisms. Contamination of food products can occur at various stages, including during slaughter, processing, packaging, and distribution. Poor hygiene practices, inadequate cooking, and improper storage further exacerbate the problem, increasing the risk of AMR transmission. Globalization has intensified the complexity of AMR in food. The international trade of food products means that resistant bacteria can cross geographical boundaries, making it a shared challenge for all nations. This interconnectedness underscores the need for a coordinated global response to mitigate the risks associated with AMR. AMR in food microbiology is not confined to meat products; it also extends to plant-based foods. The use of antimicrobials in agricultural practices, such as irrigation with contaminated water or the application of antimicrobial agents to crops, can introduce resistant bacteria into fruits, vegetables, and grains. As a result, even vegetarian and vegan diets are not immune to the threats posed by AMR [3, 4].

The emergence of multidrug-resistant bacteria, or "superbugs," further compounds the issue. These organisms exhibit resistance to multiple classes of antimicrobials, rendering them particularly difficult to treat. In the context of food, the presence of superbugs poses an alarming risk to public health and highlights the urgent need for preventive measures. Efforts to address AMR in food require a multidisciplinary approach. Policymakers, researchers, food producers, and consumers all have roles to play in combating this challenge. Strategies such as stricter regulations on antimicrobial use in agriculture, enhanced surveillance systems, and improved hygiene practices are critical components of a comprehensive response. Consumer awareness and behavior also play a significant role in mitigating AMR risks. By choosing products from sources that adhere to responsible antimicrobial use practices and following proper food handling and preparation guidelines, consumers can contribute to reducing the spread of resistant microorganisms [5, 6].

Research and innovation are essential to addressing the AMR crisis in food microbiology. The development of alternative strategies, such as probiotics, prebiotics, and phage therapy, offers promising avenues for reducing reliance on traditional antimicrobials. Additionally, advancements in metagenomics and molecular diagnostics provide valuable tools for detecting and monitoring resistant strains in the food chain. Collaboration between nations, sectors, and disciplines is vital for tackling AMR in food effectively. International organizations such as the World Health Organization (WHO) and the Food and Agriculture Organization (FAO) have emphasized the importance of a "One Health" approach, recognizing the interconnectedness of human, animal, and environmental health. Education and training are equally important in addressing AMR. Empowering farmers, food handlers, and healthcare professionals with knowledge about antimicrobial stewardship and resistance mechanisms can drive behavioral change and promote responsible practices [7, 8].

While progress has been made in understanding and addressing AMR, significant challenges remain. The lack of consistent global standards for antimicrobial use in food production and the limited availability of data in certain regions hinder the development of effective policies and interventions. The economic implications of AMR in food microbiology cannot be overlooked. The costs associated with treating resistant infections, productivity losses, and the potential impact on trade and consumer confidence underscore the need for urgent action. Climate change and environmental factors further complicate the AMR landscape. Rising temperatures, altered precipitation patterns, and changes in agricultural practices

***Correspondence to**: Moutien Hudaa, Department of Agriculture, University of Mauritius, Mauritius. E-mail: Moutien@utien.mu

***Received:** 01-Nov-2024, Manuscript No. AAFMY-24-155770; **Editor assigned**: 02-Nov-2024, PreQC No. AAFMY-24-155770(PQ); **Reviewed**: 18-Nov-2024, QC No AAFMY-24-155770; **Revised**: 22-Nov-2024, Manuscript No. AAFMY-24-155770(R); **Published**: 29-Nov-2024, DOI:10.35841/aafmy-8.6.235*

***Citation:** Hudaa M. Antimicrobial resistance in food: A growing global concern. J Food Microbiol. 2024; 8(6):235*

can influence the distribution and persistence of resistant bacteria in the food chain. Antimicrobial resistance in food is a multifaceted issue that demands a holistic and collaborative approach. By addressing the root causes, enhancing surveillance and research, and fostering global cooperation, we can mitigate the risks posed by AMR and safeguard public health, food security, and economic stability for future generations [9, 10].

Conclusion

The study of microbial interactions in food microbiology is essential for advancing food science, enhancing food safety, and meeting the growing demand for high-quality, nutritious foods. Understanding both beneficial and harmful microbial dynamics enables scientists and industry professionals to make informed decisions about food preservation, processing, and storage. As research in microbial interactions and food microbiomes continues to expand, the food industry stands to benefit from improved quality control methods, innovative food products, and safer consumption practices. Emphasizing microbial balance and safety will ultimately lead to a healthier, more sustainable food supply for future generations.

Reference

1. Lee KT. Quality and safety aspects of meat products as affected by various physical manipulations of packaging materials. Meat Sci. 2010;86(1):138-50.
2. Leibman KC. Metabolism and toxicity of styrene. Environ Health Perspect. 1975;11:115-9.
3. Labuza TP, Breene WM. Applications of "active packaging" for improvement of shelf-life and nutritional quality of fresh and extended shelf-life foods 1. J Food Process Preserv. 1989;13(1):1-69.
4. Lau OW, Wong SK. Contamination in food from packaging material. J Chromatogr A. 2000;882(1-2):255-70.
5. Lawson G, Barkby CT, Lawson C. Contaminant migration from food packaging laminates used for heat and eat meals. Fresenius J Anal Chem. 1996;354:483-9.
6. Petterson SR, Ashbolt NJ, Sharma A. Microbial risks from wastewater irrigation of salad crops: A screening-level risk assessment. Water Environ Res. 2001;73(6):667-72.
7. Cooley M, Carychao D, Crawford-Miksza L, et al. Incidence and tracking of *Escherichia coli* O157: H7 in a major produce production region in California. PloS One. 2007;2(11):1159.
8. Gil MI, Selma MV, Suslow T, et al. Pre-and postharvest preventive measures and intervention strategies to control microbial food safety hazards of fresh leafy vegetables. Crit Rev Food Sci Nutr. 2015;55(4):453-68.
9. Brandl MT. Fitness of human enteric pathogens on plants and implications for food safety. Annu Rev Phytopathol. 2006;44:367-92.
10. Markland SM, Shortlidge KL, Hoover DG, et al. Survival of pathogenic *Escherichia coli* on basil, lettuce, and spinach. Zoonoses Public Health. 2013;60(8):563-71.

Citation: *Hudaa M. Antimicrobial resistance in food: A growing global concern. J Food Microbiol. 2024; 8(6):235*