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Editorial

Food Microbiological Risk Assessment

Srinivas Rao*

Department of Food Technology, Andhra University, Andhra Pradesh, India

E-mail: raosrinivas.dr@gmail.com

EDITORIAL

Food Microbiological Risk Assessment (MRA) is a critical technique used by both the food industry and government agencies to assure food safety and define appropriate management strategies. The major goal of microbiological risk assessment in food is to determine the chance of a food-borne pathogen causing sickness in humans after ingestion of a particular food item. When appropriate, MRA seeks to determine whether a minimum amount must be consumed before consumers' health is jeopardised. Furthermore, MRA seeks to explore and identify ways for lowering the level of health risk by lowering the incidence of food-borne disease and/or the severity of the possible disease. Foodborne pathogens are prokaryotic and eukaryotic bacteria with varying affinities for different foods and distinct incubation periods. Colonization by pathogenic bacteria such as *E. coli, Salmonella spp., Campylobacter spp*., and some *Bacillus* strains is the most serious problem for fresh foods. Foodborne viruses like Listeria monocytogenes and various fungal strains, on the other hand, are the main issue for processed and long-term storage foods.

Viruses and prions are also key infective agents that provide a significant health risk to consumers, particularly in animal-based foods. Foodborne viruses such as rotavirus, norovirus, and hepatitis-A virus cause severe enteric infections defined by gastroenteric symptoms that are frequently followed by secondary problems. One of the main avenues for the spread of Transmissible Spongiform Encephalopathies is through the consumption of meat infected with misfolded prion proteins. The infective protein's high heat tolerance and protease activity make it easy to spread the disease across animals and between animals and humans via food. Foodborne infections have a wide range of virulence factors and etiopathogenetic processes, resulting in a wide range of diseases and symptoms. These are a significant financial burden on the health system, and in the case of acute infections, they are linked to a higher mortality rate, particularly among the elderly and immunocompromised customers.

Many microbes produce extracellular polymeric compounds (mostly glycoproteins and polysaccharides) that aid their adhesion to abiotic surfaces and/or attachment to the surface of other microorganisms, in addition to the typical virulence factors. Other than allowing bacteria to persist to cleaners, sanitizers, and antimicrobial treatments, this results in the production of a biofilm that provides protection against the most generally used antibacterial procedures (e.g. UV radiation, desiccation, osmotic shock, pH change).

Foodborne pathogens are classified as either infective or toxigenic agents, depending on how they cause poisoning. Highly invasive bacteria in the first category are capable of active replication in the gastrointestinal tract and ultimate systemic spread in the host body (e.g. *Salmonella spp., Escherichia coli, Campylobacter jejuni* etc). Microorganisms that cause food poisoning via toxins belong to the second class of pathogens. Toxins can be either endotoxins (pathogen cell structural components) or exotoxins (pathogen cell exotoxins). Toxic organisms like *Clostridium botulinum, Bacillus cereus, Fusarium spp*., and *Aspergillus spp*. can produce toxins during the intestinal transition and/or directly in the food during production and storage. Toxins may cause immediate symptoms, but they are more likely to cause chronic long-term consequences such teratogenicity, hepatotoxicity, nephrotoxicity, and immunotoxicity, most likely as a result of toxins building up over time.