

The application of omics in food quality and safety

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Abstract:

Food Safety and Quality affect economic by increasing the shelf life of the food product, increase importation and exportation of the food product, increase the productivity of the workers, increase the national productivity and give good news about the food product. Food safety means the food is free from hazards, either biological, physical and chemical hazards. Food safety and quality affect human health by lowering the occurrence of foodborne diseases, improve of the health status of the consumers and lowering the numbers of sick peoples in the hospitals. A new approach in the food quality and food safety, the progress in the analytical methods in the food processing and production brought about a novel and modern approach related to the food quality and the food safety.

The omics approach in the food is a recently coined expression and is an integration of relevant, omics disciplines. The application of omics in the biology and the medical domains. The food and the nutrition researchers have been interested in these omics approach research. The omics is a tool used for detection of the food constituents and the nutrients at the molecular level. Researches in the food area use the analytical techniques through different omics disciplines as prote omics, metabol omics, lipid omics, nutrigen omics, metagen omics and transcript omics. The using the different omics techniques separately or in combination not only in the analytical methods of the food constituents used also in the food authentication and for detection of the food safety and the food quality. The using of advanced analytical techniques in omics branch has empowered the researchers who studying the food and the nutrition. The analytical techniques used in each “omics” discipline and how omics approach elucidates the arguments related to the food quality, the food safety, the origin of the food, man and women nutrition.

Key Words: Consumer, omics, food safety, food quality.

Introduction

The consumer concerns related to the food safety parameters and globalization of the food production trade have resulted in a global and interconnected system for the production and distribution of the food. In the last decade many public and private standards on the food safety and quality have been improved due to these developments (31,32,33,34,35 and 36). Food processing companies from developing countries and emerging economies have problems to comply with these standards, the increasing of the marginal costs of certification and accreditation puts more economic pressures on the food processing companies profits in developing countries in the world (37,38,39,40 and 41). The combined impacts of these effects ask for strategies to reevaluate the cost and the effectiveness of the certification and the accreditation methods (42,43,44,45,46 and 47). The public concerns about the food safety analytical techniques to meet the inspection requirements of high sensitivity, specificity, and reproducibility (48,49,50,51,52,53 and 54). Enzyme-mimetic nanomaterials or nanozymes, which combine enzyme-like properties with nanoscale features as an excellent tool for the food safety and

quality, the fundamental principles nanozymes for the food quality and safety detection technique in the food production. The peroxidase, oxidase, and catalase-like nanozymes, are able to detect the major food analyses (1,2,3,4,5 and 6). The discrimination of the roles of nanozymes in diverse detection platforms. The applications of nanozymes in detecting various endogenous ingredients and exogenous contaminants in the foods (7,8,9,10,11 and 12). The nanozyme-based detection techniques to practical-oriented food analytical techniques, while some challenges in optimization of nanozymes, diversification of recognition-to-signal manners, and sustainability of the techniques needed (13,14,15,16,17 and 18).

Standards related to food quality and safety :

The food quality and safety standards that are critically important not only for developed countries, but also for developing economies, where the consumers' safety is among the primary issues to be considered in the food supply chain management (55,56,57,58,59 and 60). After the rapid development of many economies, quality standards have focused on consumers' demand for safe food. The

documents, certifying the food quality and safety are getting much more attention, together with the production supervision and control from the starting phase, the producer, up to the market chain's end (61,62,63,64,65 and 66). The ecological factors and their effects, as the chemicals, the pesticides, the food hygiene and control, the ethical trade and the production, are among the components of the food quality standard groups. Clients' higher expectations leads to the higher requirements on producers and exporters, which need to ensure the higher food safety to enter internal and external markets (72,73,74,75 and 76). Quality concept in the food production puts an emphasis on conformity with the product's intended purpose; the safety; the satisfaction of the consumer's expectations and perceptions (77,78,79,80,81 and 82). The consumers pay attention to the first two, but their expectations involve a number of different factors, as the price, the taste, the appearance, the production system, the nutritious content and the fair trade, among others (83,84,85,86,87 and 88). The food product quality must be sound and reliable, low prices, so the companies must develop standardized procedures for production and selling processes (89,90,91,92,93,94 and 95). The needed quality standards are designed to meet the requirements of the consumers and the regulations. The food content, product description, chemical safety, sanitary conditions, among others. Farmers and production companies have the greatest responsibility for the food safety assurance (96,97,98,99,100 and 101). In addition, farmers and production companies need to prove that they have applied diligence and traceability practices (102,103,104,105 and 106).

The smart food packaging :

The development of chemical sensors and biosensors over several decades has been investigated producing novel and very interesting sensor devices with great promise for the application including the food production (107,108,109,110 and 111). The including of such sensors into the food packaging production produces a smart packaging. The smart packaging use the chemical sensor or biosensor to monitor the food quality the food safety of the food from the farm to the consumers. The smart packaging can use a variety of sensor suitable for monitoring of the food quality and the food safety, as freshness, pathogens, leakage, carbon dioxide, oxygen, pH, time or temperature (112,113,114,115 and 116). The smart packaging is needed as on-line quality control and the food safety in term of consumers, authorities and the food producers, and has great potential in the development of new sensing systems integrated in the food packaging, the control of the weight, the volume, the colour and the appearance (117,118,119 and 120).

Biogenic amines :

The food safety and the food quality are the main concerns of the consumer and human health sector in different countries around the world. The market globalization have led to increase in the number of humans affected by food poisoning which have different origins as bacteria, virus, parasites, mold, contaminants and others. Some cases of food poisoning can be traced back to the chemical and the natural toxins (25,26,27,28,29 and 30). One of the toxins is the biogenic amine histamine in the food constitute a potential public health importance due to their physiological and toxicological effects. The consumption of the foods containing high content of biogenic amines has been associated with health hazards (31,32,33,34,35 and 36). Food poisoning cases associated with the biogenic amines in food throughout the world, mainly in relation to histamines in fish. The biogenic amines are found in varying levels in different types of foods as fish, cheese, meat, vegetables, etc., and the biogenic amines formation is affected by different factors associated with the raw

material making up food products, microorganisms, production and preservation methods. The biogenic amines are heat stable. The biogenic amines plays an important role as indicators of the food quality and the food acceptability. The biogenic amines must be controlled to ensure the food quality and the food safety (19,20,21,22,23 and 24).

Risks and benefits in food safety and quality

The food composition analysis is concerned with both the beneficial and the harmful food components in the human food as the nutrients, the bioactive non-nutrients, the anti-nutrients, the toxicants, the contaminants and the other potentially useful and dangerous elements (88,89,90,91,92,93 and 94). The food safety include the elements of the nutrition such as the known risk factors for certain chronic diseases, the nutrients in the form of fortificants and the supplements, the genetically modified foods, the functional foods, the high levels of nutrient additives and nutritional supplements are included (101,102,103,104,105 and 106).

The food quality parameters

Any food attributes used to evaluate quality can be deemed quality parameters. The quality defined as different things to different peoples in the food supply chain, so the specific parameters used can vary. The food quality implies the total characteristics that define its value and satisfy its stated needs (71,72,73,74,75 and 76). The food quality is related to food characteristics, such as nutrition, organoleptic properties, as the taste or the smell, and the sanitation. Using qualities of convenience and conservational impact, and the psychosocial qualities of satisfaction throughout Parameters commonly used food quality testing as the color of the skin and the inner flesh, The texture, which is detected as the firmness, the sweetness is measured as soluble sugars in BRIX, the sourness is measured as the titrable acidity. The acids evaluated will depend on the food .Phytochemicals to detect the nutritional and the health benefits of the food. Toxins, like aflatoxins that indicate the safety and hygienic condition of the food product (51,52,53,54,55,56 and 57).

Fresh Product Quality Parameters:

Numerous factors affect the food quality, depending on stage of the food supply chain. The factors have long-lasting effects on the food product quality as the good manufacturing practices, the environmental conditions, the soil, and the genotypes (21,22,23,24,25 and 26).

The consumer obtain the food safety by:

Efficient cleaning of the food serving establishments as clean the kitchen surfaces after preparing the foods. After handling the raw meat, poultry, fish and other raw foods always wash hands. Thorough cooking of the food, follow recipes and label instructions on cooking times and temperatures. Pre-heat the oven properly. Check the food is piping hot before serving. Double check that sausages, burgers, pork and poultry are cooked right through; they should not be 'rare' or pink in the core and when pierced with a knife any juices that run out of the meat should be clear, not bloody (61,62,63,64,65 and 66). Avoid cross food contamination, human food poisoning is often caused when harmful bacteria are present on one food are spread via hands or kitchen utensils to cross-contaminate other foods. Good sanitation helps prevent this. Keep raw foods separate from cooked and ready-to-eat food at all times. Chilling, do not put hot food directly into the fridge or freezer, let it cool sufficiently first; but remember that cooling should be completed within one or two hours after cooking

(67,68,69,70 and 71).

Conclusion:

The food quality parameters are categorized as the product and the process attributes. The product attributes can be appearance, texture, taste, smell, safety, the postproduction life, and the convenience. The process attributes can be the origin of the product, the methods of production, and the environmental conditions.

Though product attributes are more often associated with end consumers, increasingly both product and process attributes are being considered by those throughout the supply chain.

Conflicts of Interest

The author declare no conflicts of interest

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