

Research article

Evaluation of Hazards in food

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Abstract

A food contaminant refers to any substance that is present in the human food and can potentially cause harm to the consumers. The contaminated food may be biological, chemical, or physical in nature. They can be naturally occurring in the food material or introduced during the food production, handling, or storage. Every human food business is mandated to establish controls and monitoring procedures against the human food contaminants. A food object is referred to as contaminated if it comes in contact with an unwanted substance and could result in severe illness or injury if it is consumed. The Contamination can occur through various means, including biological, chemical, or physical sources, and it is a significant concern for the food safety and quality assurance in the industry.

Keywords: Food contaminants, hazards, biological, chemical, physical

Introduction

The contaminated food is a severe public health issue in the world, leading to the human foodborne illness that affect humans annually. The Contamination describes a situation of the presence of unwanted elements that is not appropriate for use. The contaminated food usually happens when foreign particles such as the microorganisms, the chemicals, and the insects are present. Several incidents related to the contaminated food, the human food mislabeling, and the human food safety have been recorded, which has attracted more attentions (1,2,3,4,5,6 and 7). The development of reliable and efficient techniques of detection was challenging due to the complexity of the human food matrices and trace levels of contaminants in the human food. The biosensor is an alternative with the excellent selectivity, the specificity, the sensitivity, the usability, the flexibility, the low cost, and the quick processing time. The toxicological elements, and the biosensor technology risk analysis (8,9,10,11,12,13 and 14). The Different applications of the biosensor technology for the identification of the chemical food contaminants, including the pesticides, the heavy metals, the migratory substances from the packaging materials, the pollutants, and the unapproved and the dangerous food additives in the human food (15,16,17,18,19,20 and 21).

Types of the contaminated food

The three types of the contaminated foods are the following:

The Biological food contamination, The Chemical food contamination, The Physical food contamination

These types are the major categories of the contaminated food and do not include others, such as allergenic food contamination and radiological food contamination. It depends up on the type of raw materials and products being produced, the most common human food hazards in a business may vary (22,23,24,25,26,27 and 28).

The Biological food contamination

One of the most common types of food contamination, biological food contamination, refers to the presence of harmful microorganisms such as bacteria, molds, yeasts, viruses, and parasites. These harmful agents are collectively known as the human food pathogens. It Depend up on the biological hazards in the human food, their effects can range from mild problems such as the nausea to the life-threatening foodborne illnesses. Some of the most common biological food contaminants in the human food industry include the Norovirus, the Salmonella, the Nontyphoidal Salmonella, the Escherichia coli (E. coli), the Shigella, the Hepatitis A (29,30,31,32,33,34,35 and 36). These pathogens are the top six microorganisms that cause foodborne illnesses in the US. Other pathogens such as the Clostridium botulinum, the

Staphylococcus aureus, and the Listeria are also top contenders in this category. The biological food contaminants or otherwise termed the microbiological contaminants. Every year, the effect of these pathogens' accounts for at least 20% of the foodborne illnesses in the US. The Effects and examples of the biological food contamination (37,38,39,40,41 and 42). The Biological contaminations can produce distinct changes in food items after a while. In favorable conditions, such as in the temperature danger zone, the biological food contaminants can produce the following changes to the human food, produce acid and lower the pH of the product, produce a bad smell, Change the color of the human food, Soften the texture of the food. These changes indicate the human food spoilage and that the human food products are not safe for consumption anymore. The effects of biological food contamination can be severe; they can always be prevented and controlled. The Proper human food safety practices and constant monitoring are key to controlling biological contaminants. With an effective human food safety management system, the sources of these food contaminants can be controlled and rooted out. Some biological food contaminants are naturally part of fresh produce, especially those that are grown from the soil and are exposed to environmental contaminations, such as root crops. Perishable foods, such as the unpasteurized milk, the milk products, the raw sprouts, the leafy greens, the raw fish, and raw meat, are very nutritious, and they make a good growing medium for infectious organisms. The effects of biological food contamination can cause health risks when not handled properly. In addition, drinking water contaminants can be a very dangerous source of these biological contaminants (31,32,33,34,35 and 36). The food Contaminants can enter the food production system during the human food preparation process through contaminated water when raw materials are washed. This fact tells you that any human food ingredient must be properly prepared and cooked to prevent illnesses causing microorganisms from causing any damage or harm to consumers. The Washing of Hands with blue latex gloves disinfecting tomatoes to decontaminate the fruit from the coronavirus. By Washing the fruit with water and lye to remove viruses (37,38,39,40,41 and 42).

The Chemical food contamination

the Chemical food contamination refers to the presence of the unwanted chemicals in the human foods that can compromise their safety. The most common chemical contaminant examples in the human food establishments include the cleaning solutions, the Fertilizer residues, the Pesticides, the Industrial oils, the Additives, the Production by products. The mentioned chemical food contaminants can enter a food business at any point and contaminate the foods. The Chemical food contaminants carry a great threat to the health of the consumers (43,44,45,46,47, and 48). Their effects can vary depending on the sources and the concentrations. The Chemical food contaminations can be divided into different categories based on their origin, the Industrial, the Agricultural, the Toxic heavy metal, the Natural While the chemical food contaminations occur less often than the biological food contamination, their potential to cause the damage is significant. The Effects and the examples of the chemical food contamination, Some the chemical food contamination, such as the cleaning agents, can cause the burning, the swelling, the gastric problems, and sometimes even the long-term effects (49,50,51,52,53 and 54). The Chemical substances may be introduced to the human food being made through improper use and the food handling. Some examples of the chemical food contamination in a food establishment, the cleaning products, when not properly removed, can stay on the kitchen surfaces and then become transferred to the human food. The kitchen tools coated with the nonfood grade materials have been reported to have the contaminated foods with the toxic metals. The Agricultural products such as the fertilizer residues and the pesticides can stay on the raw produce (55,56,57,58,59 and 60). The Substances such as the additives can be considered contaminants when added in excess or found in the products that shouldn't be in. The preparation of the food also plays a great role when it comes to the chemical food contamination. The improper washing of the fresh produce can leave traces of the fertilizers or the pesticides that can find their way into the other human food products. The effects of these unwashed food contaminants can worsen when exposed to the heat and served to the customers. The food byproducts such as the acrylamide can be used as an indication of the temperature abuse. This substance is a harmful chemical that is considered a carcinogen. The Controlling the chemical food contamination. The Sanitizer Concentration Log and The Cleaning and the Sanitation Checklist help to minimize and control cases of the chemical food contamination in the commercial human food facilities (61,62,63,64,65 and 65). The Physical food contamination the Physical food contamination is the presence of the unwanted foreign materials in the food. These foreign materials can cause the injuries, the bleeding, the choking, and the broken teeth when ingested. The food physical hazards can block the air passage and prevent the normal breathing (66,67,68,69,70 and 71). The Physical food contaminants can be categorized as the natural or the unnatural depending on the nature of the food contaminant. The physical food contamination include the presence of the Natural physical food contaminants, the Bone fragments, the Feathers or hair, the Pit, stem, and the skin of the raw fruits, the Pest droppings, the Unnatural physical food contaminants, the Glass, the Plastic, the Soil or sand, the Metal shards, the personal effects (e.g., jewelry). the Natural physical food contaminants are naturally part of the food materials, such as the fruit stems, whereas the unnatural ones include the stones, the glass, and the metal fragments. The Physical food contaminants, depending on their size, can be detected through the visual detection (72,73,74,75,76 and 77). The Effects

and examples of the physical food contamination. When undetected, the physical food contaminations can cause serious injuries to the consumers. Some may cause the injury, whereas others can create the cuts to the throat or the mouth. The Physical contaminants can come from the food handlers and become transferred, such as the fingernails or the hair in the human food. In addition to causing the injuries, these food contaminants can become precursors to other types of the food contamination, such as the biological food contamination (78,79,80,81,82 and 83). The Fingernails can introduce the harmful organisms to the food. Such is also the case when it comes to the physical food contamination from the pests. The Foodborne pathogens and illnesses can result if these contaminants are introduced into the human food. This effect highlights the importance of the pest management outside of the production area. Cases of the physical food contamination can result in a widespread food recall in the human food manufacturers. The presence of the physical food contaminants has topped the charts of the food recalls. These food contaminants were recorded composed of the hard and the soft plastics, the metal, the rubber, and the glass, which may originate from the packaging materials and the unmaintained equipment. The concept of the human fast food and the ecology. A man in a cap and a beard, holding a hamburger, and with disgust pulls out a thread (84,85,86, 87 and 88). The effective way to control the different types of the contaminated food. While these food contaminants can easily go into the food being prepared, the food handlers can prevent them with an effective human food safety management system. The Proper preventive and control measures can be put in place to ensure that these food contaminations are well monitored. We can implement a digital. The Food Safety Management System (FSMS). At Food Docs, we offer an intuitive solution to control the risk of the human food poisoning. Using our smart Food Monitoring System, you can be sure that the human food safety practices are done effectively and on time (89,90,91, 92, 92 and 94). The Common sources of the contaminated foods can be addressed even before they can create any damage. With our monitoring tasks set at autofill, our kitchen staff can save time and promote the accuracy of recordings. Our Food Safety System features detailed instructions on how to perform the food safety tasks. We can ensure that every employee will perform the tasks exactly as instructed, ensuring the human food safety daily. We can upload our versions of the instructional materials to make training more personal for our business (95,96,97,98,99 and 100). The Monitoring tasks with detailed instructions. The main cause of the contaminated food. The main cause of contaminated food is the biological agents including the pathogenic bacteria, the viruses, the molds, the yeasts, and the parasites. Of the 250 identified foodborne illnesses by the Centers for Disease Control and Prevention (CDC), the majority are attributed to different types of the bacteria, the viruses, and the parasites. The human Foodborne illnesses resulting from the biological food contaminants cause symptoms such as the vomiting, the diarrhea, and the abdominal pain. When left untreated, they can become life-threatening (101,102,103, 104, 105 and 106). One factor why the biological food contaminants are considered the main cause of the contaminated food is their ability to transfer from one place to another. The Bacteria and other types of the pathogens can easily be spread through the cross-food contamination. Due to the pathogens are too tiny to be seen, the food handlers who do not practice the safe food handling can spread them from one point to another. By simply holding the raw foods and then a piece of the equipment or a clean utensil, the naturally present pathogens can spread (107,108,109,110,111 and 112). We can learn more about how quickly the bacterial food contamination can occur from one of our articles. The five most common ways for the human food to become contaminated in a human food establishment are the Cross-food contamination, the Low-quality food materials, the Improper food storage conditions, the Unclean food preparation conditions and the Poor personal hygiene (113,114,115,116,117,118 and 119).

Conclusion:

This is why one of the best ways to prevent the microbial food contamination is to regularly and correctly wash the hands. The worst carrier of contamination in human food service is a food handler who does not regularly wash his or her hands. The Microorganisms can be controlled through the proper human food handling practices. Their number can be easily controlled with the operations such as cooking properly, the cleaning and the sanitizing, and the storing human foods in the right conditions.

Conflicts of Interest: The authors declare no conflicts of interest.

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