

New Insights on Role of Different Microbes in Food Poisoning, Food Spoilage and Advances in Food Technology

Muhammad Anwar Ul Haq¹, Mehjabeen^{2*}, Musrat Nazir³, Anoshi², Javeria Maryam³, Rakhshandha Urooj³, Taha Ali², Muhammad Arif²

¹Department of Horticulture, Faculty of Agricultural Sciences and Technology, Bahauddin Zakariya University-60800, Multan

²National Institute of Food Science and Technology, Faculty of Food, Nutrition and Home Science, University of Agriculture Faisalabad Pakistan

³Institute of Food & Nutritional Sciences, PMAS Arid Agriculture University Rawalpindi Pakistan

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*Corresponding author: Mehjabeen

Abstract

Fermented foods have special functional qualities that provide consumers with health advantages owing to the presence of active microorganisms that include probiotic capabilities, antibacterial, antioxidative, peptide synthesis, and other properties. The bacteria like lactic acid bacteria are used in the production of cheese, pickles and yoghurt. Moreover, extensive types of molds are used in sausages surface ripening, in preserving products natural quality and are used to control the formation of unwanted flavors in different products. The determination of contaminated food with microorganisms is not possible without testing microbiologically. *Staphylococcus aureus* is the most dangerous type of bacteria and the main source of its infection are humans. The foods which are contaminated with *C.perfringens*, when consumed a toxin is produced in human intestinal tract and cause illness. The two main food borne types of viruses are the norovirus and Hepatitis A. Vector borne spread of disease occur when a parasite goes in host by the saliva of insect during the blood meal such as malaria, or from the parasites present in feces of insect which excretes directly after the blood meal. It's also important to understand how the cell detects the presence of the pore, whether it's through ion concentrations.

Keywords: Foods, microbial infections, pathogens, food microbes, viruses.

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INTRODUCTION

There are few types of fungi, mostly the molds, which form the antibiotics, hormones enzymes and organic acids. All the fungi are not beneficial for humans and the agriculture crops, only the few are beneficial and others are harmful to humans as well as for the agriculture crops [1, 2]. The harmful fungi cause different types diseases in humans, animals and to agriculture crops. They also produce the very poisonous toxins in the food. Microbiology makes significant contributions to the food business; they are utilized in the manufacture of a variety of food items and are also responsible for food deterioration, resulting in poisoning and disease [3]. Fermented foods have special functional qualities that provide consumers with health advantages owing to the presence of active microorganisms that include probiotic capabilities, antibacterial, antioxidative, peptide synthesis, and other properties. Some of the health advantages of fermented products from across the world include diabetes

prevention, nutrient synthesis, allergic responses, prevention of cardiovascular disease, gastrointestinal problems, and cancer prevention [4, 5].

Different components of essential food ingredients

The foods obtained from fermentation process cause harmful effects to the health because of presence of biogenic amines. These amines have the low molecular weight and these compounds are obtained by the precursor amino acid after microbial decarboxylation and from the ketones and aldehyde transamination by the enzyme's amino acid transaminases [6]. The microbes are used in different food industries now days. In alcoholic beverages fermentation and for making leaven bread, yeast including the *Saccharomyces cerevisiae* is used. The bacteria like lactic acid bacteria are used in the production of cheese, pickles and yoghurt. Some certain of cheeses like Stilton, blue cheese and Gorgonzola use the molds to help in the ripening and provides

characteristic flavor. There are many other uses of bacteria i.e., citric acid production, in drinks and yoghurt probiotic supplement addition, and in the production of vinegar [7, 8].



Fig-1: Shows the sources of different food ingredients

Pasteurized milk is inoculated with a colony of microorganisms to make fermented milk. Yogurt and cheese are just two examples of fermented dairy products. Yogurt is a dairy-product made from milk that has been fermented by microorganisms. Cow's milk is most commonly used; however, it may be prepared with any type of milk. It may be made with any type of milk, including whole, skimmed, dry, evaporated, or semi-skimmed [9-11]. The meat starter cultures are utilized to make the fermented goods like pepperoni, dried ham, chorizo and salami and also in the formation of dried products. The lactic acid bacteria are used to make the color and flavors in different products. Moreover, extensive types of molds are used in sausages surface ripening, in preserving products natural quality and are used to control the formation of unwanted flavors in different products [12, 13].

PUFAs are the structural gears of the cell membrane; these components maintain the permeability, fluidity and the flexibility of membrane. These components also play a vital role in the metabolism of mammals as a metabolite's precursor, controls the biological functions like leukotrienes, thromboxanes and prostaglandins [14].

Foodstuffs which are dirtied with the pathogenic organisms usually do not look contaminated, smell bad or taste bad. The determination of contaminated food with microorganisms is not

possible without testing microbiologically [15]. To avoid the contamination in food which effects health, it is necessary to eliminate and control the microorganisms from the foodstuffs. The contaminated food harms the health badly and causes the lethal diseases in humans [16].

The food contamination can occur at any stage during the production: processing, growing, processing, harvesting, preparing, storing or shipping stage. Cross contamination, the transmission of damaging organisms from the one surface to another is often the main cause. This is particularly worrying for raw, natural foods, like salads and other foods. Because these foods are not baked, the harmful microorganisms are not demolished before eating and cause the food-poisoning [16, 17].

Different pathogens associated food poisoning

Staphylococcus aureus is the most dangerous type of bacteria and the main source of its infection are humans. These bacteria harm the humans badly by causing lethal diseases. These bacteria are mostly found in healthy people skin and in very less amount in nose. They are found in higher amounts in skin lesions such as infected eczema, or in pus containing lesions.

The infected should avoid the contaminated foods. Food intoxication produced by this bacterium is caused by the heat resilient staphylo toxin, resulting in vomiting, fever, cramps and diarrhea. The symptoms start quickly and generally vanish within the 24 hours [18, 19]. The foods which cause the salmonella infections are eggs and eggs products, the cooked foods specially the chicken, turtle and eel etc. These foods are contaminated with the salmonella. Moreover, the food contamination may occur by pets and rats [20].

C. perfringens found in the dust, soil and in the gastrointestinal tract of man and animals. The foods which are contaminated with *C. perfringens*, when consumed a toxin is produced in human intestinal tract and cause illness. *C. perfringens* is the heat resilient bacteria and can exist in cooked foods, survive and grow in large numbers when the foods are cooked under the low temperatures [21]. Poultry and meat dishes, gravies and sauces are those foods which are involved most. The hot foods should be served quickly after cooking or held above the 140 °F. When foods like meat dishes, gravies etc. stored in refrigerator, divide them in small parts so that they will cool rapidly. The refrigerated food or the old food should be rewarmed to 165 °F before serving [22].

Viruses are simplest and smallest microorganisms. Unlike yeasts, molds and bacteria, the viruses have the ability to reproduce independently. The viruses first occupy the host cells and then multiply in large numbers. Hence, viruses are parasitic organisms.

Normally the viruses occupy the specific host cells; some viruses infect only one species, while some species infect all the closely related species [23, 24].

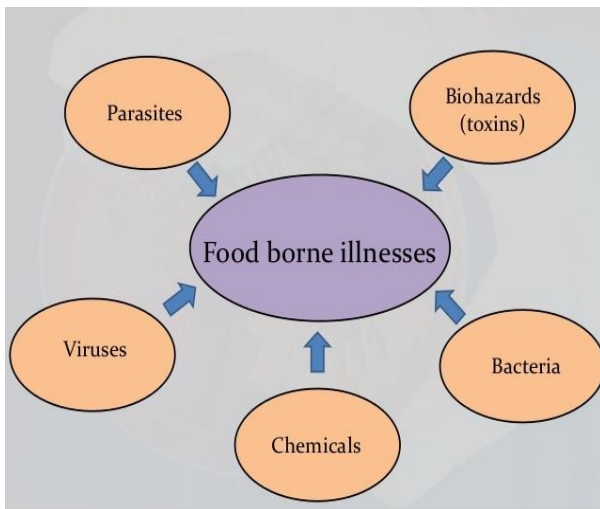


Fig-2: Shows the different microbes in foods

A virus is not as common as bacteria when it comes to food poisoning, but it is still a possibility. The two main food borne types of viruses are the norovirus and Hepatitis A. Commonly; these viruses contaminate the foods which have been grown up near the manure. Food intoxication of this kind generally results in a recall of dirtied foods for safety of consumers [25].

By consuming these foods, the parasites which acquired are nematodes, protozoa, cestodes and trematodes. The main genera of these parasites are *Fasciola*, *Gnathostoma*, *Opisthorchis*, *Anisakis*, *Taenia*, *Trichinella*, *Paragonimus*, *Toxoplasma*, *Fasciolopsis*, *Angiostrongylus*, *Clonorchis*, *Echinostoma* and *Spirometra*. This food borne parasite infections are health problems globally [26].

If the water comes in to interaction with the stools of diseased people, this water also become contaminated with virus. This polluted water also spread viruses in the foods. For instance, if this polluted water is utilized in different products, the virus spread in these products and cause harmful effects on health. Likewise, shellfish which lived in the contaminated water can contain viruses [26]. About 15% people eat the contaminated meat and have intestinal disease, which leads to diarrhea and gastroenteritis. The meat should be proper cooked otherwise different diseases invaded the human health. When the larvae of virus move from the intestine to the other body parts, people directly feel fever, upper eyelids inflammation, pain in muscles, headaches and many other symptoms. The symptoms directly depend on parasite numbers. A less numbers of sternly affected people may experience the rashes on the skin and neurologic and respiratory

symptoms. Infrequently, it leads to death like heart failure [26, 27].

Vector borne spread of disease occur when a parasite goes in host by the saliva of insect during the blood meal such as malaria, or from the parasites present in feces of insect which excretes directly after the blood meal such as the Chagas disease. The parasites which transmitted by the insects, they circulate in the blood and resides in different body organs and damage these body organs. For the proper growth and metabolism, the microorganisms require specific types of nutrients and the quantity of nutrients. Commonly, these nutrients are water, minerals, vitamins, nitrogen, and a proper energy source [28, 29].

Preventive measures against food borne infections/spoilage

The quality and the safety of food depend on specific factors and harmful or favorable contagious properties. The perception of the food safety altered in current years from the hazard based to risk-based approach and the precautionary interferences are required from pre-harvest level to processing of food. In primary production of foods, the microbe's utilization may be useful for the production animals and also for the human health. The microorganisms are useful for humans in many ways, many of the food stuffs are being processed by the help of these microorganisms [29-31].

CONCLUSION

The research of PFT (pore forming toxins) in the cell membrane has shown the processes that occur in the route that forms the pore. The formation mechanism is now properly understood, step by step. The goal of the research is to understand the process in detail so that antibodies, drugs, and other compounds can be developed to block its effects. It's also important to understand how the cell detects the presence of the pore, whether it's through ion concentrations or cytoplasmic signals, so that it can run membrane damage repair mechanisms.

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