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Predominant Food Borne Zoonoses and Need for Prevention and Control: A Review

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Abstract: Food-borne infections are caused by bacteria present in food. If bacteria become numerous and the food is consumed, bacteria may continue to grow in intestines and cause illness. *Salmonella*, *Campylobacter*, hemorrhagic *E. coli* and *Listeria* all cause infections. Food intoxication results from consumption of toxins (or poisons) produced in food by bacterial growth. Toxins released by bacteria cause illness in human beings. Common kinds of bacteria that produce toxins include *Staphylococcus aureus* and *Clostridium botulinum*. In the case of *Clostridium perfringens*, illness is caused by toxins released in the gut after consumption of huge numbers of vegetative cells.

Key words: Bacteria, Food-borne infections, Toxins

Introduction

Food is liable to be contaminated at any stage from producer to consumer. Mostly all outbreaks of food poisoning occur during the summer months. In many European countries, food poisoning is not properly reported at times. In entirely There veterinarians are generally vested with the duty of food inspection

Commonly occurring food-borne infections of public health significance

Salmonellosis: There are a group of bacteria of more than 2300 types or species commonly known as Paratyphoid Bacteria. They inhabit in the intestine of clinically healthy man and animal and also pathogenic for men or animals or both. *Salmonella* can exist in feces or on pastures for considerable period. They are not destroyed in carcass or offal maintained at chilling or freezing temperature. *Salmonella* can also grow well on meat at ordinary temperature. It is probable cause of 75% of outbreaks of food poisoning *Salmonella* Typhimurium is found in rat, mice, cattle, sheep, goat, pig fowl and duck. *S. Enteritidis* also cause meat food poisoning and it is commonly found in rat, cattle, pig, goat and duck.¹ Typical food poisoning commences within 7-72 hours after ingestion of the organisms. The foods involved is generally egg, meat and milk and is often derived from infected animals, but may also contaminated during storage or preparation.. *Salmonella* food poisoning is characterized by nausea, vomiting, chills, abdominal pain and diarrhea. *Salmonella* must be controlled during processing and manufacturing of animal feeds, by frequent disposal of animal excreta in livestock farms and by transportation of livestock in convenient manner to reduce stress.

Campylobacteriosis:

Campylobacteriosis or *Campylobacter enteritis* is caused by consuming food or water contaminated with the bacteria *Campylobacter jejuni*. *C. jejuni* commonly is found in the intestinal tracts of healthy animals and in untreated surface water. Raw and inadequately cooked foods of animal origin and non-chlorinated water are the most common sources of human infection. Diarrhea, nausea, abdominal cramps, muscle pain, headache and fever are common symptoms. Onset usually occurs in 2-5 days after eating contaminated food. Rarely deaths have also been reported. Preventive measures for *Campylobacter* infections include pasteurizing milk, avoiding post-pasteurization contamination, properly cooking meat and allied products. c) Listeriosis: Listeriosis primarily affects newborn infants, pregnant women, the elderly and those with compromised immune systems. In a healthy non-pregnant person, listeriosis may occur as a mild illness with fever, headaches, nausea and vomiting. Among

pregnant women, intrauterine or cervical infections may result in spontaneous abortion or still birth. Infants born alive may develop meningitis. The mortality rate in diagnosed cases is 20-35%. The incubation period is a few days to several weeks. Infection is usually derived from meat, poultry and fish products. Preventive measures for listeriosis include maintaining good sanitation, turning over refrigerated, pasteurization and avoiding post-pasteurization contamination of food products.

Staphylococcal intoxication: *Staphylococcus* spp. of bacteria are found on the skin and in the nose and throat of most people; people with colds and sinus infections are often carriers. Infected wounds, pimples, boils and acne are generally rich sources. *Staphylococcus* also is widespread in untreated water, raw milk and sewage. When *Staphylococcus* bacteria get into warm food and multiply, they produce a toxin or poison that causes illness. The toxin is not detectable by taste or smell. The bacteria itself can be killed by temperatures of 120°F. Symptoms include abdominal cramps, vomiting, severe diarrhea and exhaustion. These usually appear within 1-8 hours after eating staph-infected food and last one or two days. The illness seldom is fatal. Foods commonly involved in staphylococcal intoxication include protein foods such as ham, processed meats, tuna, chicken, sandwich fillings, cream fillings, potato and meat salads, custards, milk products and creamed potatoes. Foods that are handled frequently during preparation are prime targets for staphylococci contamination.¹

Clostridium perfringens food borne illness: *Clostridium perfringens* belong to the same genus as the botulinum organism. However, the disease produced by *C. perfringens* is not as severe as botulism and few deaths have occurred. Spores are found in soil, nonpotable water, unprocessed foods and the intestinal tract of animals and humans. Meat and poultry are frequently contaminated with these spores from one or more sources during processing. Spores of some strains are heat resistant and can survive boiling for four or more hours. Furthermore, cooking drives off oxygen, kills competitive organisms and heat-shocks the spores, all of which promote germination. Sufficient numbers of vegetative cells may be produced by the bacteria under conducive conditions to cause illness. Foods commonly involved in clostridium illness include cooked meat and processed poultry products. Symptoms appear within 8-24 hours after contaminated food is consumed. They include acute abdominal pain and diarrhea; nausea, vomiting and fever are less common. Recovery usually is within one to two days, but symptoms may persist for one or two weeks.¹

E. coli hemorrhagic colitis: *Escherichia coli* belong to a family of microorganisms called coliforms. Many strains of *E. coli* are saprophytes in animal gut. However, *E. coli* O157:H7 strain causes a distinctive and sometimes deadly disease. Symptoms begin with nonbloody diarrhea one to five days after eating contaminated food, and progress to bloody diarrhea, severe abdominal pain and moderate dehydration. In adults, the complications sometimes lead to thrombocytopenic purpura (TPP) characterized by cerebral nervous system deterioration, seizures and strokes. Minced beef is mostly associated with *E. coli* O157:H7 outbreaks, but other foods which include raw milk, unpasteurized foods not exposed to heat treatment and untreated water are also implicated. Infected food handlers with the disease likely help spread the bacteria.² Preventive strategies for *E. coli* infections include thorough washing and other measures to reduce the presence of the microorganism on raw food, thorough cooking of raw animal products, and avoiding recontamination of cooked meat with raw meat. To be safe, cook ground meats to 160°F.²

Viruses: Nearly one-third of food poisoning incidences worldwide majorly in developed countries is believed to be viral in origin. In USA, viral food intoxications contribute to overall 50% cases annually including norovirus as prominent source, which individually share 57% of the total outbreaks in this regard. The severity of virus borne food intoxications have intermediate incubation period causing illnesses which may be self limited or have the potential to spread among healthy individuals. Common viral etiology includes Enterovirus.³

Hepatitis A causes viral illnesses through the carrier of food lasting for 2-6 weeks incubation period and generally characterized by its systemic nature of spread throughout the system of individual. It also leads to liver damage and dysfunction through causation of jaundice. Liver damage caused can be acute or chronic in nature. The infection can originate from consumption of fresh products or those which have been exposed to fecal contamination.^{4,5}

Summary

Exotoxins from bacteria alter the appearance, odor and flavor of food. Food-borne illness can be prevented by proper cooking, adequate heat treatment and refrigeration of food products. Certain guidelines have been laid down by the Food Safety and Inspection Service of USDA as essential in preventing bacterial food-borne illness.

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