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FOOD BORNE DISEASES AN OVERVIEW

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ABSTRACT

The food borne diseases is rapidly changing their epidemiology. Recently described pathogens, such as Escherichia coli and the epidemic strain of Salmonella serotype Typhimurium Definitive Type 104 have become important public health problems. Well- recognized pathogens, such as Salmonella serotype Enteritidis, have increased in prevalence or become associated with new vehicles. Emergence in food borne diseases is driven by the same forces as emergence in other infectious diseases: changes in demographic characteristics, human behavior, industry, and technology; the shift toward a global economy; microbial adaptation; and the breakdown in the public health infrastructure. Addressing emerging food borne diseases will require more sensitive and enhanced methods of laboratory identification and sub typing, and effective prevention and control. The epidemiology of food borne disease is changing. New pathogens have the contamination of human food with sewage or animal manure.

KEYWORDS

E. coli, Pathogens, Disease and Contamination.

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INTRODUCTION

Food borne illness is any illness resulting from the consumption of contaminated food, pathogenic bacteria, viruses, or parasites that contaminate food, as well as chemical or natural toxins such as poisonous mushrooms. It also referred to food poisoning. Food borne illness usually arises from improper handling, preparation, or food storage. Bacteria are a common cause of food borne illness. Here we are mainly discussing about four food borne pathogens Campylobacter Jejuni, E.coli, Vibrio vulnificus and Listeria monocytogene. Some types of microbes stay in the intestine, some produce a toxin that is absorbed into the bloodstream, and some can directly invade deeper body tissues[1, 2].

Campylobacter Jejuni

Campylobacter jejuni, an emerging food borne pathogen not recognized as a cause of human illness until the late 1970 is now considered the leading cause of food borne bacterial infection. An estimated four million C. jejuni infection occurs each year in the United States; most sporadic infections are associated with improper preparation or consumption of mishandled poultry products. Incidence of campylo bacteriosis is particularly high among young men. The high incidence of disease in this group may reflect poor food preparation skills. Most C. jejuni out- breaks, which are far less common than sporadic illnesses, are associated with consumption of raw milk or unchlorinated water[4].

The Guillain-Barré syndrome, an acute paralytic illness that may leave chronic deficits, may follow Campylobacter infections[3]. In a multicenter study of 118 patients with Guillain- Barré syndrome in the United States, 36 % had serologic evidence of C. jejuni infection in the weeks before neurologic symptoms developed[8].

E. coli O157:H7

E. coli O157:H7 was first recognized as a human pathogen in 1982 when two outbreaks in the United States were associated with consumption of undercooked hamburgers from a fast-food restaurant chain [8]. The pathogen has since emerged as a major cause of bloody and non- bloody diarrhea, causing as many as 20,000 cases and 250 deaths per year in the United States[9,8]. Outbreaks have been reported in Canada, Japan, Africa, the United Kingdom, and else- where. In addition to causing bloody diarrhea, E. coli O157:H7 infection is the most common cause of the hemolytic uremic syndrome, the leading cause of acute kidney failure in children in the United States. The syndrome is associated with long-term complications; 3 % to 5 % of patients with hemolytic uremic syndrome die, and approximately 12 % have sequelae including end-stage renal disease, hypertension and neurologic injury[8]. Consumption of ground beef, lettuce[10], raw cider [11], raw milk, and untreated water have been implicated in outbreaks, and person-to-person transmission is well documented.

Vibrio vulnificus

In the late 1970s, Vibrio vulnificus was recog- nized to cause a usually severe syndrome of food borne V. vulnificus infection called primary septicemia. V. vulnificus primary septicemia gene- rally affects people with underlying disease, particularly liver disease. Patients become ill within 7 days after eating raw molluscan shell- fish. Trace backs implicate shellfish harvested from warm water areas. The symptoms may include shock and bullous skin lesions and may quickly progress to death. Most reported shellfish associated V. vulnificus infections are fatal[12].

Listeria monocytogenes

Since the early 1980s, food borne transmission has been recognized as a major source of human listeriosis [13]. Listeriosis can cause stillbirths, miscarriages, meningitis, or sepsis in immuno- compromised hosts. Case-fatality rates as high as 40 % have been reported during outbreaks. Outbreaks have been associated with ready-to- eat foods, including cole slaw, milk probably contaminated after pasteurization, pate, pork tongue in jelly, and soft cheese made with inadequately pasteurized milk. The U.S. Department of Agriculture and U.S. Food and Drug Administration established zero tolerance policies for L. monocytogenes in foods in 1989. From 1989 to 1993, the food industry launched efforts to reduce Listeria contamination in processed foods, and dietary recommendations were established and publicized for persons at increased risk for invasive listeriosis. During this 4-year interval, the incidence of listeriosis declined by 40 % in nine surveillance areas across the United States [14].

Prevention of food borne diseases

Meeting the complex challenge of food borne disease prevention will require the collaboration of regulatory agencies and industry to make food safely and keep it safe throughout the industrial chain of production. Prevention can be built into the industry by identifying and controlling the key points from field, farm, or fishing ground to the dinner table at which contamination can either occur or be eliminated. The general strategy known as Hazard Analysis and Critical Control Points (HACCP) replaces the strategy of final product inspection. Some simple control strategies are self-evident, once the reality of microbial contamination is recognized. For example, shipping fruit from Central America with clean ice or in closed refrigerator trucks, rather than with ice made from untreated river water, is common sense. Similarly, requiring oyster harvesters to use toilets with holding tanks on their oyster boats is an obvious way to reduce fecal contamination of shallow oyster beds. Pasteurization provides the extra barrier that will prevent E. coli O157:H7 and other pathogens from contaminating a large batch of freshly squeezed juice.

For many food borne diseases, multiple choices for prevention are available, and the best answer may be to apply several steps simultaneously. For E. coli O157:H7 infections related to the cattle reservoir, pasteurizing milk and cooking meat thoroughly provide an important measure of protection but are insufficient by themselves. Options for better control include continued improvements in slaughter plant hygiene and control measures under HACCP, developing additives to cattle feed that alter the microbial growth either in the feed or in the bovine rumen to make cows less hospitable hosts for E. coli O157, immunizing or otherwise protecting the cows so that they do not become infected in the first place, and irradiating beef after slaughter. For C. jejuni infections related to the poultry reservoir, future control options may include modification of the slaughter process to reduce contamination of chicken carcasses by bile or by water baths, freezing chicken carcasses to reduce Campylobacter counts, chlorinating the water that chickens drink to prevent them from getting infected, vaccinating chickens, and irradiating poultry carcasses after slaughter.

Outbreaks are often fertile sources of new research questions. Translating these questions into research agendas is an important part of the overall prevention effort. Applied research is needed to improve strategies of subtyping and surveillance. Veterinary and agricultural re- search on the farm is needed to answer the questions about whether and how a pathogen such as E. coli O157:H7 persists in the bovine reservoir, to establish the size and dynamics of a reservoir for this organism in wild deer, and to look at potential routes of contamination connecting animal manure and lettuce fields. More research is needed regarding foods defined as sources in large outbreaks to develop better control strategies and better barriers to contamination and microbial growth and to understand the behavior of new pathogens in specific foods. Research is also needed to improve the diagnosis, clinical management and treatment of severe food borne infections and to improve our understanding of the pathogenesis of new and emerging pathogens. To assess and evaluate potential prevention strategies, applied research is needed into the costs and potential benefits of each or of combinations[15,16].

Risk Assessment and International Food Standards

The movement of ever-increasing quantities of food across borders has resulted in a transnationalization of disease risk[17]. Therefore, the globalization of food trade and the open access to foreign markets need to be accompanied by effective means of health protection for populations. In the food sector, international regulatory instruments need to be integrated with strengthened surveillance and monitoring.

As a result of the Uruguay Round of Multilateral Trade Negotiations and the in- creased liberalization of trade facilitated by this agreement, concern about the safety of imported food has grown. However, provisions in the Agreement on the Application of Sanitary and Phyto sanitary Measures, which entered into force with the establishment of the World Trade Organization on January 1, 1995, are designed to address these concerns: according to the work of the Codex

Alimentarius Commission, its standards, guidelines, and recommendations are recognized as the reference for national food safety requirements. Countries that are members of the World Trade Organization may no longer be able to reject foods that meet Codex standards, guidelines, and recommendations without providing justification. Moreover, the increased volume of the global food trade underscores the need for sound epidemiologic information and international risk assessment. In this regard, Article 5 of the Sanitary and Phytosanitary Measures agreement explicitly requires World Trade Organization members to conduct scientific and consistent risk assessments. Furthermore, the World Health Organization has recommended that the application of the HACCP system at every stage of the food chain represents an effective approach for governments to meet the terms outlined in the agreement [18].

Another issue receiving more attention from regulatory agencies and underlined during the Food and Agriculture Organization/World Health Organization Conference on Food Standards, Chemicals in Food, and Food Trade (1991), is the scientific basis of the Codex standards. The Conference recommended that the Codex, in its norm-setting work on health and safety, place greater emphasis on risk assessment[19]. Epidemiologic data on food borne diseases have an important role in risk assessment. One example is assessing the risk of contracting listeriosis associated with different levels of Listeria monocytogenes in smoked fish and meat products [20]. However, the need for risk assessment as the basis for setting standards has shown a great gap in knowledge about food borne pathogens and their relation to human illness [21-22]. To address the national/ transnational risks caused by food borne diseases, this gap must be narrowed.

CONCLUSION

The globalization of the risks associated with food borne illness, specifically increased international travel and trade in food, has resulted in greater interdependence in terms of food safety. Therefore, internationally agreed-upon food safety standards and other types of agreements are becoming increasingly important in addressing the complex transnational challenge of food borne disease control. Epidemiologic data provide a common ground for reaching international consensus on food safety issues.

As Morris Potter has said, If one recognizes that ensuring food safety is inherently uncertain, food borne illnesses be- come opportunities to learn rather than failures to predict. Food borne disease will occur, and we must be prepared to react quickly to reduce the risk of new food borne hazards [23].

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