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Research Article

The Relationship between Cross Food Contamination and Foodborne Illness Due to Drug-resistant Bacteria

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Abstract

Cross food contamination means transportation of bacteria or other microorganisms from one substance to the food. Cross food contamination can happen during any stage of food production. Each year, a large number of people's worldwide experience a foodborne illness, while there are number of causes, a most and common preventable one is cross food contamination. Cross food contamination as Bacterial cross food contamination is defined as the transportation of bacteria or other microorganisms from one substance to food. Other types of cross food contamination include the transportation of food allergens, chemicals, or toxins. Foodborne illness may caused by eating at restaurants, but there are many ways in which cross food contamination can occur, including, primary food production, from plants and animals on farms, during harvest or slaughtering of food animals, secondary food production including food processing and manufacturing, transportation of food, storage of food, distribution of food, grocery stores, farmer's markets, and more, food preparation and serving at home, restaurants, and other foodservice operations, Given that there are many points at which cross food contamination can occur, it's important to learn about the different types and how we can prevent cross food contamination.

Keywords: Cross Food Contamination; Drug-Resistant Bacteria;-Food; Foodborne Illness

Introduction

The term cross food contamination generally refers to a food contamination from other sources. Where this cross food contamination is considered as one of the most prevalent foodborne illness in human, producing well-recognized detrimental effects on human health and profitability of poultry, fish, dairy, meat and other human foods. Besides health disorders of the humans, cross food contamination can also cause significant losses in food yield, alterations in its quality (impaired nutritive and technological properties of food), fertility dis-orders and even systemic diseases may also occur, microorganisms causing cross food contamination carry a health risk for human populations via the food chain. The disease affects a large number of humans throughout the world as a result of rich nutritional contents and the production and processing procedures in commercial food production that render it susceptible to contamination by pathogenic microbes that could cause diseases in humans. The cross food contamination is a complex multi-factorial disease, occurs depending on variables related to the animals, environment, and pathogens. Among these pathogens, bacterial agents are the most common and widely distributed in the environment. The microbial causes of cross food contamination include a wide variety of micro-organisms (aerobic and anaerobic bacteria, mycoplasmas, yeasts and fungi). Of these microorganisms the Staphylococcus aureus, Escherichia coli and other coliforms are the most common causes of contagious and environmental clinical cross food contamination.

Cross food contamination occurred most frequently by bacteria causing disease, where the sanitary conditions are important component of their prevention**,** this indiscriminate use of antimicrobials has led to the development of Multidrug-Resistant (MDR) Gram-negative bacteria in raw food, in particular E. coli O157:H7, Klebsiella pneumoniae (K. pneumoniae), Aeromonas hydrophilia (A. hydrophilia), and Proteus mirabilis (P. mirabilis). From these Multidrug-Resistant (MDR) bacteria, the Coagulase-positive Staphylococci and Escherichia Coli are of real concern for public health; they can be a reservoir for Antimicrobial Resistance (AMR) genes and can play a role in the spread of genes to other pathogenic and commensal bacteria in the farm environment. Staphylococcus aureus and other Coagulase-Positive Staphylococci (CoPS) are zoonotic, opportunistic and facultative pathogenic bacteria that pathogens associated with a large spectrum of diseases in humansincluding ruminants, S. aureus may cause severe or sub-clinical mastitis. This study aimed to investigate the molecular profile, antimicrobial resistance, and genotype/phenotype correlation of 212 S. aureus isolates recovered from cases of bovine mastitis from 2014 to 2015 in the Shanghai and Zhejiang areas of China. Nineteen sequence types (STs. The intoxication caused by S. aureus ranks third out of common food poisoning causes, and it is associated with consumption of different categories of food including raw food and dairy products, subsequently the organism can cause a multitude of infections due to the expression of various toxins, virulence factors, and cell wall adhesion proteins. Escherichia coli is one of the most important pathogens inducing clinical environmental cross food contamination, this organism is ubiquitous in the farm where healthy animals, even humans, are the carriers of this pathogen subsequently improper food procedures, season changing, behaviour or weakened host immunity can provide opportunities for intramammary infection of E. coli**.** cross food contamination caused by Escherichia coli can

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range from being a subclinical infection of the mammary gland to a severe systemic disease, whereas human-dependent factors such as sex and age affect the severity of E. coli cross food contamination. Lipopolysaccharide (LPS), a component of the cell wall of gram-negative bacteria, is considered to be the primary virulence factor in coliform bacteria, being responsible for most pathophysiological reactions in E. coli cross food contamination.

The characterization of the antibiotic-resistance profile of these bacteria that causes cross food contamination is crucial for a correct antibiotic choice and an effective treatment. The antimicrobial resistance patterns and biofilm formation of coagulase-positive staphylococci and Escherichia coli isolated from cow meat samples**.** The antimicrobial resistance patterns and biofilm formation of coagulase-positive staphylococci and Escherichia coli isolated from cross food contamination.

Main Types of food cross contamination: There are three main types of cross food contamination, food to food, equipment to food, and people to food cross food contamination [1-5].

Food to food cross food contamination: as Adding contaminated foods to non-contaminated foods leading to food-to-food cross food contamination [6-10]. This allows harmful drug-resistant bacteria to spread and populate. Raw, undercooked, or improperly washed food can harbour large amounts of drug-resistant bacteria, such as *Salmonella, Clostridium perfringens, Campylobacter, Staphylococcus aureus, E. coli,* and *Listeria monocytogenes*, all of which can harm our health if we consumed it [11-15]. Foods that pose the highest risk of bacterial contamination include leafy greens, bean sprouts, leftover rice, unpasteurized milk, soft cheeses, and deli meats, as well as raw eggs, chicken, meat, and seafood [16-20]. For example, adding unwashed, contaminated lettuce to a fresh salad can contaminate the other ingredients [21-24]. This was the case in *E. Coli* outbreak that affected customers. What's more, leftovers kept in the fridge too long time can causes bacterial overgrowth. Therefore, eat leftovers within few days and cook them to proper temperatures [25-28]. If we plan to mix leftovers with other foods, the new meal should not be stored again as leftovers [29-33].

From the equipment to the food type of cross food contamination: From the equipment to the food type of cross food contamination is one of the most common yet unrecognized types of cross food contamination [34-37]. Bacteria can survive for long periods on surfaces like countertops, utensils, cutting boards, storage containers, and food manufacturing equipment [38-41]. When equipment is not washed properly or unknowingly contaminated with drug-resistant bacteria, Cross food contamination can transportation large volumes of harmful drug-resistant bacteria to food [42-45]. From the equipment to the food type of cross food contamination can happen at any point during food production, both at home and in food manufacturing places [46-49]. Sliced meat caused death of customers due to listeria-contaminated meat slicers [50-54]. A common example of this occurring at home is using the same cutting board and knife to cut raw meat and vegetables, which are harmful if the vegetables are then consumed raw [55-58]. Older participants were less likely to clean their cutting boards after working with raw meat, while child's weren't aware of the risks of cross food contamination [59-63]. Thus, more food safety awareness seems to be used across all ages [64-68]. Improper food preservation methods causes cross food contamination. In home-canned potatoes used in a potato salad made potluck attendees sick with food poisoning botulism due to inefficient canning operation [69-73].

From human to food cross food contamination: Humans can easily transportation drug-resistant bacteria from their bodies or clothes to food during handling of food preparations [74-78]. Person may cough into their hand or touch raw chicken meat and continue to prepare food without washing their hands in between. Hand washing before cooking or preparing food, while washed hands after sneezing or coughing lower hand contamination [79-84]. Using a cell phone that's loaded with drug-resistant bacteria while cooking or wiping hands with a dirty apron or towel. These practices may contaminate hands and spread drug resistant bacteria to food or equipments [85-89]. Food safety awareness both in the home and at work can significantly lower the risk of cross food contamination and unsafe food practices. By far, the most effective way to reduce the risk of cross food contamination is to wash hands [90-95]. There are three main types of cross food contamination, food to food, equipment to food, and people to food. In each type, drug-resistant bacteria are transported from a contaminated source to uncontaminated food [96-100].

Effects of cross food **contamination on the consumer:** The effects of cross food contamination can be mild to severe. Minor side effects include upset human stomach, loss of appetite, headache, nausea, and diarrhoea. Usually, these effects present within one day, although they can appear weeks after exposure, making it difficult to determine the specific cause. In cases involving vomiting or diarrhoea, it's important to rehydrate properly for example with a sports beverage to restore hydration, blood sugar level, and electrolyte levels. Severe side effects include diarrhoea for more than three days, bloody stools, fever, dehydration, organ failure, and even death. Seek immediate medical attention if our side effects worsen or last longer than one to two days, as well as if we're considered to be in an at risk population [101-105]. Effects of cross food contamination range from human stomach upset to more severe after effects, including dehydration, organ function failure, and even death may occurred [106-108].

Peoples at risk of cross food contamination: Everyone in human is at risk of becoming sick from cross food contamination. Certain groups are at a much higher risk, including, pregnant females, children under the age of five years, adults over the age of 65 years, those with weakened immune systems, as people with HIV/AIDS, uncontrolled diabetes, or cancer, Considering these groups make up a large number of the population, it's important to practice safe food handling when at home or working in a foodservice establishment. Anyone is at risk of becoming sick from cross food contamination. However, certain groups, including pregnant females, children, older adults, and those with weakened immune systems, are at the highest risk.

Avoidance rules of cross food contamination: There are many ways to avoid cross food contamination as food purchasing and storage, avoid purchasing food after its expiration date, unless we are intend to eat it right away. Store raw meat in a sealed suitable container or suitable plastic bag on the bottom shelf of the refrigerator to prevent juices from leaking onto other foods. Use separate grocery suitable bags for raw meat and eggs. Use refrigerated leftover food within 2–3 days and cook it to proper temperatures [108]. Food preparation, by washing hands with soap and water after touching raw meat, petting an animal, uses the washroom, coughing or sneezing. Washing utensils, counter tops, cutting boards, and other surfaces, especially when handling raw meat. Use separate cutting boards for meat, fish, chicken and vegetables. Use clean sponges and dishcloths. Thorough cooking of the foods to their proper temperatures. Food recalls by visiting the

website of food and disease control board [103-107]. Bacterial cross food contamination can have dangerous and even fatal consequences, but, it's easy to prevent. Practice good hygiene, wash and sanitize the equipment, and properly store and serve food to prevent cross food contamination. In addition, it's a good idea to stay up to date with food recalls, which are available online. By practicing safe food handling, we can protect our self and others from getting sick [98-102].

Conclusion

There is positive relationship between Cross food Contamination and foodborne illness By application of Proper food safety and food hygiene practices we can reduce risk of cross food contamination. By thoroughly hand washing and surfaces, proper storage of food, and stay up to date apply food recalls.

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