

Salmonella: causes, effects and solutions



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There are many causes lead to food poisoning such as chemicals, fungi and microbes. Salmonella bacteria are the most common causes associated with foodborne illness in the world. In Saudi Arabia, as result of the increase of temperature, the environment there is suitable to grow microbes in food and that lead to spoil food, thus occurrence food poisoning. In this research, salmonella food poisoning is discussed and the sources of these bacteria in Saudi Arabia are determined. The research also focuses on the relationship between some of common food with Salmonella, such as shawarma chicken sandwiches.

Food poisoning is common among people specially children and oldsters because they do not have enough immunity to resist diseases. There are several definitions of food poisoning but it is simply defined as any illness disorder occur in human body specifically in the digestive system and that because of consuming food or drink which are contaminated with bacteria or toxins.

The symptoms of food poisoning are various between people, for example (Gamarra 2008) notes that:

The symptoms, varying in degree and combination, include abdominal pain, vomiting, diarrhea, and headaches; more serious cases can result in life-threatening neurologic, hepatic, and renal syndromes leading to permanent disability or death.

Although the multiplicity of foodborne diseases which are transmitted through food, the food poisoning that occurs as a result of bacteria come in the fore. Furthermore, food is an important factor for growth of bacteria and

it provides an appropriate medium for bacterial colonies. There are two types of microbial food poisoning; first one is real poisoning microbes and that caused by bacterial toxins which are secreted in food, such as Staphylococcus and Clostridium botulinum. Second type is food infection, and that because of the presence of microbes in food is greatly, such as salmonella.

Definition

Salmonella bacteria is objectionable guest in homes and restaurants and the infection occur when human eat foods which contain salmonella microbes. This bacterium was named after Dr. Daniel Salmon discovered it in 1885(Davis n. d) (7). In general, salmonella is a germ which exists in the intestines of people and animals and spread by their feces. There are different kinds of salmonella and all of them give rise to poisoning.

Salmonella Growth & survival

The suitable temperatures for salmonella growth are ranging from 35 c to 37c, However (ESR Ltd Company 2001) points out that, “ salmonella TPHI can be survive at 5 c and over 45 c” (3). On the other hand, freezing foods hinders the growth of the salmonella, but will not destroy it. Also, the pH of food influences the growth and survival of salmonella, the range in which salmonella will grow is about 3. 8 – 9. 5.

However, salmonella bacteria can only be destroyed by cooking food for enough time with high temperature and each kind of food has a specific cooking temperature that enough to destroy the bacteria.

Salmonella sources

Normally, salmonella exists in different places, so there are several sources of salmonella infection. The natural home is the intestinal tracts of humans and other animals, including birds (Cliver 1990, p. 189). Salmonella are usually transmitted to humans by eating foods contaminated with animal feces. The major source is food of animal origin, such as meat, poultry, milk and dairy products, eggs, seafood, that have not been cooked properly, in addition to some fruits and vegetables. Certainly, contacts with animals as sheep and chicken or also pets transmit the bacteria. Although, chicks and young birds carry salmonella in their feces, they look like healthy and the symptoms are unapparent on the birds. (Cliver 1990, p 200) remarks that, the birds can coexist with the microbes naturally. Another source of infection is people and that due contact with salmonellosis people directly or by food handlers and that because of hygienic lack.

Salmonella symptoms

The symptoms of salmonella infection usually appear within 6 – 72 hours after eating or drinking contaminated food, and include; fever, stomachache, diarrhea, nausea and sometimes vomiting. The illness is usually takes from 1-7 days and treatment is not required, so most people recover without treatment. However, children and the elderly people have to see a doctor if affected. (Illinois Department of Public Health n. d) (8).

Salmonella around the world

In last decade, food borne illness are increased at the global level especially salmonella infections and that due to many factors. Gamarra's perspective is that, changing food habits which is caused by travel and movement between

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countries is one of the essential factors , in addition to that the International trade and the globalization of food production lead to transmission of food microbes between countries(2008). The Outbreak of salmonella food poisoning which is caused by contaminated tomatoes in many states in USA and Canada is an example. On the other hand, the emergence of new strains of salmonella which resist drugs is caused by excessive abuse of antibiotics and organic fertilizers.

Table 3. Examples of Large Food-Borne Disease Outbreaks in some countries, salmonella in the lead (Gamarra 2008)(1)

Country: United Kingdom

Year: 1985

Disease: Salmonellosis

Number of Cases: 1000

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Country: Saudi Arabia

Year: 2005

Disease: Salmonellosis

Number of Cases: 3336

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Country: United States

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Year: 1993

Disease: Salmonellosis

Number of Cases: 224, 000

-

Country: Germany

Year: 1993

Disease: Salmonellosis

Number of Cases: 1000

Salmonella in Saudi Arabia

The causes of salmonella infection vary from country to country and that depending on the suitable surroundings. In Saudi Arabia, hot weather, which reaches to 50c in the summer, contribute to spread of salmonella. Under this level of temperature, it is difficult to keep any food outside fridge because it will spoil quickly. Participating women to men working outside the house in addition to changing the traditional food habits lead to depending a lot of people on restaurants. These transformations in Saudi society, contribute to spread fast food restaurants. In view of the Riyadh city, it is obvious that most of the international fast food restaurants such as McDonald's, Kentucky, and Pizza Hut have become many branches of them in last decade. As will as, traditional restaurants are widespread in the city. Regrettably, those restaurants, especially the traditional restaurants, are looking for profit without any consideration of the hygienic applications. Over <https://assignbuster.com/salmonella-causes-effects-and-solutions/>

and above, these restaurants employ non-qualified staffs who do not have proper certification or experience in dealing with food.

Chicken shawarma sandwich is a common meal among Saudis, particularly at dinner time. As a result, shawarma restaurants have spread throughout Saudi Arabia and, according to Environmental Health Office statistics in Riyadh City, the number of shawarma restaurants which had obtained a license by 2000 was over 6127. There is a popular belief in Saudi Arabia that, the consumption of chicken shawarma is the major reason leading to outbreaks of salmonella infection cases and that belief without considering to other factors. Many of salmonella food poisoning reports which are circulated by newspapers and T. V refer to chicken shawarma sandwich as a culprit because the main component of shawarma sandwich is chicken, which is mainly the reservoir of this bacteria.

Shawarma are slices of marinated chicken or some times lamb which are placed on a vertical skewer. The diameter of shawarma is up to 50 cm and its weight over than 60 kilograms, in some times spices and animal fat or oil is added. For cooking, shawarma is roasted slowly on all sides as the skewer rotates in front of or over a flame for a period of several hours. When the color of surface is change to brown, shawarma is sliced by special knives into small pieces. To make a sandwich, shawarma is packed inside Arabic bread which is Round and Flat. Some time shawarma is served in a plate as a meal with homemade mayonnaise, tomatoes, and green salad.

Problem

Saudi newspapers announce salmonella food poisoning incidences and they refer specifically to chicken shawarma with a great sensitivity, also it is blamed by journalists. (Rwaishid 2008) from the Hyatt newspaper reported that , about 33 people suffered from food poisoning after eating dinner in a famous shawarma restaurant in Jeffrey town (in the east of Al-Ahsa in Saudi Arabia). The patients were transferred by ambulances to Al-Jafari General Hospital to receive a treatment. Most of the patients left the hospital one day later after received necessary treatment except five patients; one of them was under serious condition and that according to medical sources at the hospital. Following that, shawarma restaurant owner was arrested by the police because they suspected that the cause of the infection is from the food which was cooked in his restaurant. The Environmental Health office said that, all beliefs about poisoning from chicken shawarma are uncertain until the laboratory results appear. However, the shawarma sandwich involved a large proportion of salmonella bacteria and that according to the final laboratory result.

In general, chicken in shawarma might be one of the reasons that occurring poisoning and transferring salmonella infection but, it is not the only reason. Laboratory result in previous event gave a general result without specification from which part of the sandwich was taken the sample. Although the chicken is the reservoir of salmonella, there are other factors that may be transferred salmonella, such as cooks, equipment and some additives to the sandwich as salad and mayonnaise.

Basically, shawarma sandwich consists of chicken in addition to mayonnaise and salad. The salad could be the source of infection because may be irrigated it by contaminated water with that bacteria. Water sources in Saudi Arabia are scarce and rare, so water supply is depending on desalination of sea water; however in some areas which are away from the sea digging wells to provide water are common. Although all crops in Saudi Arabia depend on irrigation, consequently some farmers resort to irrigate crops by swamps or sewage especially in villages which are away from control. Irrigation crop by contaminated water is a serious health problem and transmit foodborne pathogens especially when spraying water on the plants and touch the fruit. When the crops are close to soil or under it as carrot and potatoes the possibility to contamination is more. There is an experiment conducted on tomatoes plant by (Jablasone et al, 2004) demonstrated that, there is a potential for transfer salmonella microbe from irrigation water by damage root to tomatoes fruit. On the other hand, when the salad was preparing in the restaurant may be it was not washed well, or could be left in unsanitary conditions which led to spoil.

Cooks also may be carriers of bacteria and they did not apply the hygienic rules in work place. Usually in many shawarma restaurants, cooks are preparing sandwiches without wear hand gloves or face mask and that lead easily to infect shawarma. Unfortunately, some cooks do not have a health licenses, or they may have but expired, and this is illegal and contrary with health regulations. In Saudi Arabia there are no official shawarma factories, as result for that it is manufactured in houses or in restaurants under unsanitary conditions. Primitive and unclean equipment are used and that is

certainly an important factor to grow bacteria. To shorten the time some cooks thaw the frozen chicken directly, through hot water and that lead to spread of bacteria on chicken surface. Some times, shawarma is not sold on the same day thus it is leaved to the next day at room temperature which is up to 35 c and that is optimum for salmonella activity. On the other hand, the diameter of shwarma, which reach to 50 cm around skewer, is deterrent accessing heat to the center of shawarma and that provide worm clime for bacteria. Usually, shawarma is reheated on the flame for several days and that lead to spoil it, but cooks add more spices to obscure unpalatable taste.

Mayonnaise is considered one of the most sensitive foods for poisoning because of the main component of mayonnaise is raw eggs. Moreover, there is a great potential for transmission of salmonella from chicken through the eggs shall . The microbe might penetrate the broken shell then reach to yolks. Widely, homemade mayonnaise is used in shawarma restaurants; however commercially-prepared mayonnaise is more safety but it is often served in luxury restaurants. Reducing the costs and preserving the flavor are the reasons for using homemade mayonnaise. Neglecting mayonnaise outside the refrigerator for a long time or in front of flame all the day during selling shawarma are unhealthy and lead to rapid spoil.

In May 1996, Abha General Hospital (in Abha city, south-west Saudi Arabia) received 200 cases of salmonella poisoning caused by consumption dinner which bought from a restaurant specialized in fried chicken. The Investigations mainly suspected the chicken, but the laboratory result showed that the cause of poisoning was the mayonnaise and garlic which are

made in the restaurant. The incident report which was conducted by (AL-Ahmadi 1998) demonstrated that:

Only mayonnaise and minced garlic were associated with cases. Salmonella was isolated from 124 (84%) of the 159 persons with symptoms of food poisoning. Mayonnaise was prepared in the restaurant using a regular blender. Minced garlic was prepared with the same blender immediately after making the mayonnaise. Unsafe storage of the mayonnaise at room temperature for a median of 6 hours could have resulted in overgrowth of bacteria and a high infective dose of bacteria per serving.

Solutions

To reduce the incidents of salmonella food poisoning the problem is should be solved from all aspects and that trough manages of the factors which affect on spread of food borne. The solutions are shared between Environmental Health Offices and restaurants in additional to consumers. The applications of hygienic provisions are the most important things that can be observed when the consumer eating in the restaurant and that is apparently through staffs look and cleanliness of the place. Purchasing from open restaurants and small booth is unacceptable and must be banned.

In food poisoning cases which caused by shawarma, Environmental Health Officers are usually take samples from the final meal that is containing chicken, salads and mayonnaise, and this way is not determine exactly the source of contamination in the meal. Sampling from each type of food separately gives a certain result to know the source of contamination.

Likewise, visiting restaurants daily and sampling from all food and workers are also necessary.

Preventing irrigation crops by sewage and creating new methods to provide water are the first step. It can be used alternative means of irrigation system which reserve water, such as drip irrigation system, or recycle swamps and sewage treatment system. In restaurant, salad must be washed and soaked in disinfectant solution for minutes because the bacteria, especially salmonella are sensitive to sterile solutions.

Using homemade mayonnaise must be stopped decisively; it is preferable to use commercially mayonnaise. For (Omahen 1996), food scientists at the University of Georgia, Center for Food Safety demonstrated that, commercially-prepared mayonnaise actually reduces the amount of salmonella in foods because it has acid which come from vinegar and lemon. That result was approved by small test in lab, when commercial mayonnaise was added to foods inoculated with salmonella; the salmonella cells decreased.

When shawarma is preparing, following proper hygienic application is required to avoid spoil. Establishing factories which make shawarma under sanitary and clean conditions is a significant point. If shawarma is preparation in home or restaurant, leaving the frozen chicken in the fridge until gradually thaw is the best way to slow bacteria activity. To avoid cross-contamination in chicken must be throwing off of liquid that resulting from the thaw. Shawarma must be kept in refrigerator at 4 c and it is not appropriate disregard it in room temperature more than one hour. It

recommended to reducing the shawarma diameter to 20 cm and the weight to 30 kilograms and that to ensure access the flame heat into center. As well as, increasing acid proportion such as vinegar or lemon is salutary because it changes the pH of food thus prevents the growth of salmonella.

When hiring cooks, they must have appropriate qualifications and adequate experience in their field. Qualifying courses for new cooks to familiarize them with hygienic application is necessary and health license is compulsory and basic for all cooks.

Conclusion

Shawarma may be responsible for salmonella food poisoning in Saudi Arabia, especially in the summer season because it contains three kinds of food which are easily spoilt, but is not the major cause. Mayonnaise, salad, and cooks are main factors contributing to the transfer of microbes and when applying the hygienic condition, salmonella food poisoning will be decreased. Restaurants license must be restudied again and change some conditions to suit modern life. All the solutions may be effective in reducing the incidents of poisoning, but it can not change one of the most important factors that is hot weather in Saudi Arabia.