Food Poisons; Causes, Effects, And Prevention

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Abstract. The paper is an analytical review of cases of food poisoning and it's attendant draw-backs on the lives of the people. Food-borne disease has been found to occur all over the world with staggering cases of illness, hospitalization and death. Bacteria, viruses and parasites are the causative organisms while, some toxic chemicals and genetically processed food can also be involved, it is recommended that a worldwide collaborative effort should be made to eradicate food-borne illnesses.

Introduction

Most of the time we take for granted what our food contains. The analysis of the food we eat shows that, most food consists of oxygen, carbon, hydrogen and nitrogen. These elements combine in various ways to form the three basic categories of food: proteins, fats and oils and carbohydrates. Beside these other organic substances (vitamins), inorganic substances (e.g. calcium, iron etc) and water must be available in all the food [1]. These constituents of food are useful for body building and development as well as good health.

However, a number of living organism (both macro and microorganismms) interfere with our foods before it gets to the final consumer. Even the foods that are processed by an individual consumer are not very safe because of exposure to a number of harmful living organisms that interact with our food in nature. These organisms could either be bacteria, viruses, parasites (platyhelminthes and nematodes), protozoa and so on. They are responsible for a number of food-borne diseases that have occurred all over the world including the developed nations. [2]reported that, each year, food-borne illness affects about 15 percent of the population of Europe. It further stressed that in early 1980s, toxic cooking oil in spain killed about 1,000 people and made another 20,000 seriously ill. In 1999, the population of Belgium was aghast when items like eggs, poultry, cheese and butter were possibly contaminated by a poison called "dioxin". Also in Britain, its bee industry was shattered when cattle became infected with bovine spongiform encephalopathy (mad cow disease) and the consumers were horrified. In Nigeria, the then director of the National Agency for food and Drug Administration and Control (NAFDAC)[3], declared that over three million (3m) cases of acute food-poisoning and 20,000 deaths occur annually due to exposure of food to pesticides. Various reports have indicated that food poisoning have become a global problem.

In many of our communities today, food and water-borne diseases are causing a lot of problem for people especially in rural areas where the greater percentage of the population are illiterate. Many of such population are not aware of the existence of microorganisms and when their food even go

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sour they believe it occur in nature. I am aware of a man who normally contaminates his soup with fingers after dinner so that he can have a sour soup in the following morning. This is because, he prefer a soup that taste sour to a good one but I am sure he does not know the kind of reaction taking place in a sour soup neither does he know the organisms he succeeded in introducing into it. Although the man is late now, we are not quite sure of the causes of his death. The organisms that contaminate food are carriers of a number of diseases which result in a lot of symptom. These diseases which are caused by bacteria, viruses, nematodes (parasite) etc are either food-borne or water-borne and they get into the body system through the ingestion of food. This paper therefore highlights the food-borne diseases that occur all over the world with particular focus on causes effects and prevention. It is expected to be part of the current campaign to cub food-borne illness.

Food poisons: meaning and Categories

A number of complications and infections result from the taking in of food. Sometimes it is mild as to only cause illness while in some other cases it could become fatal as to lead to death. Dorland Medical Dictionary describes food-borne illness or disease as any illness resulting from the consumption of contaminated food. [4]described such food as having been altered in quality by microorganisms to objectionable taste, odour, colour and sometimes texture which renders the food unfit for human consumption.

The US CDC food poisoning guide has categorized food poisoning into two. These are "toxic agent and infectious agents". Accordingly, this publication describes food infection as the presence of bacteria or other microbes which infect the body after consumption. Food intoxication refers to the ingestion of toxins contained within the food, including bacterially produced exotoxins, which can happen even when the microbe that produced the toxin is no longer present or able to cause disease (www.wikipedia.org). According to [4], "categorization of food-borne disease is into either food intoxication or food infections". He however, said that further six classifications can be made for the purpose of simplicity. He itemized them to include: bacterial food intoxication, bacterial food infections, food-borne mycotoxicosis, algal food intoxications, illnesses from parasitic infections and viral borne infections. Therefore, any form of contamination of food resulting in illness and caused by the activities of living organisms such as bacteria, viruses, algal group, nematodes, (Parasites) and other higher animals including man is referred to as food poisoning.

Causes of Food Poisoning

Food-borne illnesses are mostly caused by pathogenic agents. It usually arises from improper handling, preparation or storage but, good practices before, during and after food preparation can reduce the chances of contracting an illness. Although natural causes, accumulation of agrochemicals, hormones and antibiotics used on farm animals and genetically modified foods abound, more focus is made here on living organisms that poison our food.

Pathogenic agents that poison food are so many but a few of them will be mentioned here based on the groups they belong. The work of Humphrey, [5]reveals that, the infectious bacteria include: campylobacter jejuni, clostridium perfringens, salmonella Spp; Escherichia coli, Bacillus Cereus, Shigella Spp; vibro Spp, clostridium Spp. Etc. those of viruses include: Enterovirus, Hepatitis A & E,Norovirus and Rotavirus, Parasites are Diphyiiobothrium spp, Nanophyetus Spp, Taenia saginata, Taenia solium, and fasciola hepatica which are all platyhelminthes. Nematodes comprise Anisakis Spp; Ascaris lumbricoides, Eustrongylides Spp; trichinella spiralis and trichuris and trichura. Protozoa includes acauthamoeba and other free-living Amoebae, Cyclospora cayetanensis, Entamoeba histolytica, Giardia lamblia, Sarcocystis hominis and toxoplasma goudii etc.

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Natural toxins such as alkaloids, ciguatera poisoning, grayantoxin (honey intoxication), mushroom toxins, shell fish toxin etc, are not produced by bacteria or the other organisms earlier mentioned. Plants in particular may be toxic but animal cases are rare.

Incubation period

This refers to the delay between consumption of contaminated food and appearance of the first symptoms of illness. It ranges from hours to days and rarely months or even years as in the case of listeriosis. This depends on agent and the quantity of food consumed. If symptoms occur within 1-6 hours after eating the food it suggests a bacterial toxin or a chemical rather than live bacteria. This long incubation period tend to cause victims to attribute symptoms to "stomach flu". During the incubation period microbes passes through the stomach into the intestine, attach to the cells lining the intestinal wall and begin to multiply. Some microbes can however produce toxin that are absorbed into the blood-stream while others directly invade tissues of the body (www.cdc.gov/neidod/disease/food/index.htm)

Effects of food poisoning

Data on food poisoning in Nigeria are not so encouraging. This is an indication that much investigation are not being done about food poisoning in Nigeria. [6]however, reported cases of food poisons due to yam flour consumption in Kano. Three different families were involved and they were treated in Aminu Kano Teaching Hospital in Kano.

According to [7], the economic and social cost of food poisoning can be very high. They further stated that salmonellosis in England and Wales was estimated to cost between £331 million in 1988 and 1989 in terms of cost production through sickness related absence from work, investigation and treatment.

[3], estimation of a yearly death of about 20,000 in Nigeria due to food poisoning was restricted to infections from pesticides. What number then comes from bacteria, viruses and parasites? By the time this is put together, a staggering figure will be obtained. Even this 20,000 people alone must have come from all sectors of the economy. It is high time we come to the realization that food-borne illnesses are depriving our communities of the man-power need to salvage our economy.

The impact created by food poisons is global. Both the developed and developing nations of the world have all recorded a huge number of casualties as a result of food poisoning. In modern times rapid globalization of food production and trade has increased the potential likelihood of food poisoning. Many outbreaks of food-borne diseases that were once contained within a small community may now take place on a global scale. Although it is not easy to estimate the global incidence of food-borne diseases, reports have shown that in the year 2000 alone, about 2.1 million people die of diarrhea and many of the cases were attributed to food and water contaminations. (www.wikipedia.org)

In the U.S., around 76 million cases of food-borne diseases, resulting in the hospitalization of 325,000 people and 5,000 deaths were estimated to occur each year. This is a report from the work of mead (1999). He further shows the statistics as follows:

- Food Net data from 1996-1998, estimated 76 million illness (26,000 cases for 100,000 inhabitants)
- 325,000 were hospitalized (111 per 100,000 inhabitants)
- 5,000 people died (1.7 per 1000,000 inhabitants).

It was also reported that medical cost of $35 billion has been expended and lost productivity in 1997.

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In France 750,000 cases (1,210 per 100,000 inhabitants) were reported with 113,000 hospital cases and 400 people died (www.invs.sante.fr/publications/2004). In Australia, there are an estimated 5.4 million cases of food-borne illnesses. Causing 18,000 hospitalization, 120 deaths, 2.1 million lost days off work etc. (www.ozfoodnet.org.au).

Food-borne diseases

When food is contaminated, it results in different form of illness depending on the organism that infects it. According to [7] there are many cases of food poisoning which develop within hours of infection. These illnesses are caused by salmonella organisms other than S. Typhi or s. paratyphi, for example salmonella enteritidis. And that, they are referred to as salmonellosis. [4]outlined food and water-borne diseases to indlude cholera, typhoid fever, camplylobacteriosis, staphylococcal intoxication, bacillus cereus poisoning, yersiniosis, botulism, clostridium perfringers poisoning, E, coli enterotoxigenic, cynobacteriosis, viral gastroenteritis etc.

These food-borne diseases appear to be so many in numbers but, there are by no means exhaustive. Details of the symptom and other clinical features of the diseases cannot be discussed here. However, a great number of these diseases are diagnosed in various hospitals and clinics as they begin several hours to several days after consumption and manifested by signs such as, nausea, abdominal pain, vomiting, diarrhea, gastroeuteritis, fever headache or fatigue etc. in most cases the body is able to permanently recover after a short period of acute discomfort and illness. Food-borne illnesses can however, result in permanent health problems or even death, especially for people at high risk including babies, young children, pregnant mothers, elderly people, sick people and others with weak immune systems (www.wikipedia.org).

Food Preservation

There are scientific ways of preserving our food to ensure that, they are free of food-borne diseases. Also there are common ways of maintaining cleanliness in the environment where foods are processed and consumed. [4]highlights a number of scientific methods to include the followings:

- Microbiological safe-guard principle which consists of preventing the entrance of microorganism into foods; elimination of microorganisms, and inhibition of the growth of microorganism.
- Arresting or inhibition of autolytic enzymes in foods which could cause objectionable colour changes known as enzymic browning.
- Prevention or elimination of biological agents such as rats, rodents, birds etc or physical factors like temperature, sunlight, mechanical impacts etc.

There is a general consensus in the public health community that regular hand-washing is one of the most effective defenses against the spread of food-borne illnesses. Therefore, the common method of preserving our food should include hand-washing, thorough cooking, keeping of food separate (based on raw meat, poultry, sea food etc), storage and proper refrigeration and throwing out of questionable foods. There are other method of food preservation like canning, heating, irradiation and more. The most important thing is a hygienic preservation that sets the food free of microbes and harmful macrobes.

Conclusion and Recommendations

There are clear indications that most of the foods we eat in most cases are contaminated with either bacteria, viruses, parasites and chemicals as well as natural sources or both. Careful selection of food and proper processing under a healthy condition is imperative. In view of this, it is recommended that:

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1. Food poisoning has occurred on a global scale. As a result a global effort toward making safe food for the entire populace is necessary.
2. Food safety should be made a compulsory program in all institutions of learning and be part of science curriculum for the purpose of training individuals to be self-reliant in food related abnormalities.
3. Food administration body in various countries should be encouraged to continue to enforce the provisions of the law that guide the protection of food the world over.
4. Members of all families should be sensitized to imbibe the spirit of hand-washing, proper cooking, general cleanliness of cooking utensils when handling food.

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