

## Foodborne parasites: The silent killers

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Parasites are organisms that derive nourishment and protection from other living organisms known as hosts. They may be transmitted from animals to humans, from humans to humans, or from humans to animals. Host-to-host consumption of contaminated food and water can also be a source of transmission. These organisms live and reproduce within the tissues and organs of infected human and animal hosts, and are often excreted in feces. They range in size from tiny, single-celled, microscopic organisms (protozoa) to larger, multi-cellular worms (helminths) that can be seen with the naked eye. The size ranges from 1 to 2  $\mu\text{m}$  (micrometers) to 2 meter long. Their lifecycle is also completely different. While some parasites use a permanent host, others go through a series of developmental phases using different animal or human hosts.

Food is an excellent vehicle by which many pathogens (bacteria, viruses/prions and parasites) can reach an appropriate colonisation site in a new host. The epidemiology of foodborne disease keeps changing day-by-day. New pathogens have emerged, and some have spread worldwide. Many, including *Salmonella*, *Escherichia coli* O157:H7, *Campylobacter*, and *Yersinia enterocolitica*, have reservoirs in healthy food from which they spread to an increasing variety of foods. Although food production practices change, the well-recognised foodborne pathogens, seem to evolve and exploit novel opportunities. These pathogens cause sporadic illness and chronic complications, as well as large and challenging outbreaks over many states and nations.

Contamination of foods or beverages with these parasites can result in symptoms ranging from mild stomach upset, headache, muscle aches, and fever to abdominal cramps, vomiting, and diarrhea. Severe cases can result in dangerous dehydration, nerve damage, paralysis, kidney failure, and death. Symptoms may develop within hours or days after eating contaminated food, and they are not always easy to distinguish from influenza or other illnesses. Foodborne parasites are of global concern.

A top 10 list identifying the foodborne parasites of greatest global concern was released on July 1, 2014, by Food and Agriculture Organisation (FAO) of the United Nations at Rome. The rankings contained in FAO-WHO report, Multi-criteria-

based ranking or risk management of foodborne parasites, are based on the parasites' burden on human health and other factors, and includes information on where they can be found. The list and supporting report were developed following a request by the global food standards body, the Codex Alimentarius Commission for FAO and WHO to review the current status of knowledge on parasites in food and their public health and trade impacts. Foodborne diseases are an important public health problem in the United States.

The Foodborne Diseases Active Surveillance Network (FoodNet) conducts surveillance in 10 US sites for all laboratory-confirmed infections caused by selected pathogens transmitted commonly through food to quantify them and monitor their incidence. This report summarises preliminary 2013 data and describes trends since 2006. In 2013, a total of 19,056 infections, 4,200 hospitalisations and 80 deaths were reported. For most infections, incidence was well above national Healthy People 2020 incidence targets and highest among children aged below 5 years.

Centers for Disease Control and Prevention (CDC), United States, a government public health agency estimates that each year, roughly 1 in 6 Americans (or 48 million people) gets sick, 1,28,000 are hospitalised, and 3,000 die of foodborne diseases. Foodborne diseases are extremely costly. Health experts estimate that the yearly cost of all foodborne diseases in the USA alone, is about \$5-6 billion in direct medical expenses and lost productivity.

The last reports from the Health Information of India in 2004 indicates 95,75,112 cases of acute diarrheal diseases, including gastroenteritis. With 2,855 deaths have been recorded and cases of foodborne diseases.

In the last decade, India witnessed a couple of following incidents related to outbreaks of foodborne parasites (according to the National Centre for Disease Control (NCDC), Directorate General of Health Services, Government of India).

A food poisoning outbreak due to *Salmonella paratyphi A*, affected 33 people, due to vegetarian food were reported from Yavatmal (Maharashtra) in 1995.

• Two separate food poisoning outbreaks due to *Salmonella weltevreden* and *Salmonella wein* affecting 34 and 10 people respectively, due to non-vegetarian food (Chicken and fish) were reported from Mangalore in 2008-09.

• In early 2008, an outbreak of avian influenza in Bangalore, led to an import ban of Indian poultry products in the Middle East, resulting in losses totaling hundreds and thousands of US dollars to the Indian economy.

Foodborne disease have a major impact on the health and economy in developing countries in the tropics and sub-tropics. Complex socioeconomic and socio-cultural factors play a vital role in the origin and maintenance of these conditions. Commenting on foodborne parasites and their impact on Indian population, Priyanka Rohatgi, President, Indian Dietetic Association, Bangalore chapter, said, "In India, foodborne diseases and infections are a serious health hazard causing large numbers of mortality and morbidity. Outbreaks of Hepatitis, Cholera and Botulism are reported every year leading to widespread loss of earnings, work output and physical sufferings. Yet, so little is known about the different types of pathogens, symptoms and treatment modes involved in food safety hazards. It's unfortunate that due to this lack of information, we often categorize all food borne ailments as cases of gastroenteritis. A list of some important foodborne illnesses to avoid are Salmonellosis, Listeriosis, Campylobacteriosis, Botulism, Cholera, E.Coli infection, Hepatitis."

"Scenario of food borne parasitic illnesses in India differs from the rest of the world due to varied food habits across the country. Other factors, such as unhygienic living conditions, lack of education, poor personal hygiene, poverty and occupation,

also contribute to the dissemination of parasitic infections. The most common foodborne parasitic infestations in India are Toxoplasmosis, Teniasis, Cryptosporidiosis, Ascariasis (Roundworm infestation), Amoebiasis, Giardiasis, Hydatidosis and Trichinellosis," said Dr Praveen Kulkarni, Assistant Professor, Department of Community Medicine, JSS University.

"India is facing the triple burden of health problems, namely, communicable diseases (incl. parasitic infestations), non-communicable diseases and maternal and child health problems. Containment of communicable diseases is a most crucial and challenging task among all. Illnesses resulting due to food borne parasitic infestations have not received the attention they truly deserve due to negligence of policy makers and health care professionals," said Dr Praveen Kulkarni. How are foodborne diseases treated? There are different kinds of foodborne diseases, which may require different kinds of treatments depending upon the symptoms they cause. Illnesses that are primarily caused can be diarrhea or vomiting, which leads to dehydration.

According to treatment approaches mentioned by CDC, if the diarrhea is severe, oral rehydration solution such as Ceralyte, Pedialyte or Oralalyte should be drunk to replace the fluid losses and prevent dehydration. Sports drinks such as Gatorade do not replace the losses correctly and should not be used for the treatment of diarrheal illness. Preparations of bismuth subsalicylate can reduce the duration and severity of simple diarrhea. If diarrhea and cramps occur, without bloody stools or fever, taking an antidiarrheal medication may provide symptomatic relief, but these medications should be avoided if there is high fever or blood in the stools because they may make the illness worse.

Foodborne parasites are silent killers. They not only spread faster, they appear to be emerging more rapidly than ever before and are able to circumvent conventional control measures. The best way to avoid them is to simply maintain a hygienic lifestyle. As per the proverb, "Prevention is better than cure" it's always better to follow a few simple precautions which can reduce the risk of foodborne diseases.

It is necessary to understand the multiple interactions of these pathogens with their environments during transmission along the food chain in order to develop effective prevention measures and control strategies. As said by Mahatma Gandhi, "It is health that is real wealth and not pieces of gold and silver." To maintain a healthy lifestyle, cleanliness plays a vital part. That is why, "Cleanliness is next to Godliness."