

How Salmonella Typhi Causes Food Poisoning?

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Salmonella Typhi is a gram-negative bacteria that belongs to the rod-shaped, i.e., the bacillus genus. Their family is recognized as Enterobacteriaceae regarding modern division, and they are named after an American veterinary surgeon, Daniel Elmer Salmon. *Salmonella* commonly causes gastrointestinal infection and illness. Infections in this regard may lead to stomach cramps, severe diarrhoea, fever, and pain that can last for several days. It is pertinent to understand some of *Salmonella*'s structural and physical features before elaborating on their way of action in gastrointestinal infections. *Salmonella* are categorized as motile enterobacteria and are non-spore-forming entities. As far as their cell diameter is concerned, it ranges from 0.7 to 1.5 μm with a length range of 2 to 5 μm . These are flagellated anaerobic bacilli having multiple antigens like O, H, and Vi. Meanwhile, different distinctive strains of *Salmonella* are categorized as complex pathogens. They are mainly divided into two main species called *S. typhimurium* and *S. enteritidis*. In comparison, multiple serotypes exist ranging from 1800 to 2500 with identical antigen presentation (Wikipedia).

Salmonella bacteria reside in the intestinal tract of animals as well as human beings and are left out of the body in the form of faeces. Usually, they are found on multiple eatables acquired from animals such as poultry, beef, milk, and eggs. *Salmonella* infection occurs at a large level in humans due to consuming contaminated dairy items, unpasteurized milk, raw and unprocessed beef, and eggs. Such type of infection is usually termed food-borne illness, which leads to gastrointestinal symptoms such as nausea, abdominal pain, vomiting as well as diarrhoea. *Salmonella* bacteria are enteric pathogens that are not life-threatening in the usual routine if the said infections are resolved without complications. Severe complications in this aspect may weaken our immune system, or prolonged infectious conditions may become life-threatening if proper treatment is not given. Further, *Salmonella* bacteria are contagious in nature and can be easily transferred from one infected person to the other through saliva, oral or faecal spread, and even through contaminated utensils. In other words, they can spread vigorously by both direct and indirect means.

Salmonella food poisoning is usually termed a *Salmonella* infection or simply salmonellosis. These bacteria have been known to cause food poisoning for human beings for more than one century. In this context, multiple strains of the above-mentioned types of *Salmonella* bacteria are solely responsible for disease outbreaks among the masses. However, people with medical conditions come at risk due to the suppression of their immune system due to severe illnesses caused by *Salmonella* bacteria. *Salmonella* illness leads to inflammation in the gastrointestinal tract of infected ones and is known as gastroenteritis. The outburst of infection in this regard mainly depends upon the replication and spreading pattern of *Salmonella* bacteria after entering the host body.

Salmonella bacteria have a very rapid growth and infectious cycle that causes multiple diseases in the host body. Once entering and penetrating the host cells, they multiply rapidly with two moods. Firstly, they enclose themselves within vacuoles, which are membrane-bounded, or secondly, they replicate in the cell cytosol. Their multiplication in the membrane-bounded vacuole or cytosol of the cell mainly depends upon the flagella motility. The mobility of flagella decides the preference of cytosol over vacuole as the cytosolic *Salmonella* have more active flagellated structures. Due to the more active mobility of flagella, cytosolic *Salmonella* acquires the ability to extrude epithelial cells and epithelial lining. *Salmonella* engulfed in the membranous vacuoles doesn't have the ability to penetrate and rupture epithelial lining at such speed. In this way, the epithelial cells, like intestinal epithelial cells that construct a membrane, got infected. These infected epithelial cells crush and rupture the membrane layer, allowing the spread of infection to other sites in the body's under-attack organs. Here, the infected cells potentially got infected due to the quick multiplication of *Salmonella* bacteria (Wilson et al.).

Meanwhile, the speedy replication and multiplication of cytosolic *Salmonella* are significant, and they have the ability to hyper-replicate in multiple epithelial cells of different parts of the digestive tract and digestive system. These epithelial cells include intestinal epithelial lining, gallbladder epithelial cells, and polarized epithelial cells that stimulate and imitate the internal environment of the intestinal tract. At the same time, they pass through gastric acid and produce various toxins by attacking the mucosa of both the large and small intestines. Invasion of infected cells of epithelial linings excretes pro-inflammatory cytokines, which ultimately stimulate an inflammatory reaction. Additionally, acute inflammations may cause diarrhoea, ulceration, and eventually, the rupture of the mucosa membrane and destruction of the mucosa. Similarly, cytosolic *Salmonella* may disseminate and lead to systematic disease. Such adaptability acquired by the progeny of cytosolic *Salmonella* enables them to survive outside the intestine trace and parts of the organ. Hence, this survival and residing ability allow cytosolic *Salmonella* to spread and multiply in the other parts and sites of the body (Guandalini et al.).

Hence, such persistence leads to severe complications and eventually serious illness bursts, with infections having multifaceted effects. Complexities of *Salmonella* food poisoning may lead to severe dehydration, which may become fatal in a prolonged way. The spread of infection other than the digestive tract may cause complications in the bloodstream. Bloodstream attacks badly suppress the immune system, especially in the case of senior citizens and very young ones. Other uncommon but existing complications may include joint pains, reactive arthritis, inflammation in the urinary tract, and chances of chronic arthritis. However, ensuring and adopting rules of good hygiene and food safety can reduce the risk of infection.

Work Cited

¹Guandalini, Stefano, and Haleh Vaziri, eds. *Diarrhea: diagnostic and therapeutic advances*. Springer Science & Business Media, 2010.

²<https://en.wikipedia.org/wiki/Salmonella>

³Wilson, Michael, and Philippa JK Wilson. "Gastroenteritis Due to Salmonella." *Close Encounters of the Microbial Kind*. Springer, Cham, 2021. 451-461.

Micro Worksheet

Q1: What is the title of your essay?

Answer: How *Salmonella Typhi* Causes Food Poisoning?

(Food poisoning is a burning issue that may lead to severe complications and is caused by contaminated food utilization. The bacteria responsible for this infection are *Salmonella Typhi*. Due to its significance and importance in the present day, I selected this question for this essay.)

Q2: What were your sources?

Answer: All the sources are mentioned at the end of the essay titled 'Work Cited'. Three sources are required according to the instructions.

Q3: Discuss the validity of each one of your sources. Be sure to make comments regarding credibility, bias, timeliness (when was your cited reference written/updated?), and information content.

Answer:

My first source is a book titled 'Diarrhea: Diagnostic and Therapeutic Advances'. The book is comprehensive and has been written by renowned scholars. It is a good book that gives detailed and necessary information about the topic. The edition I used for source purposes is of 2010.

Similarly, the second source used is Wikipedia, according to the given instructions. Usually, Wikipedia is considered a non-reliable resource, according to most researchers. But to ensure the best reliability, I used generalized and factual information to be verified by other sources to some extent. As far as the updating is concerned, it is usually updated on a regular basis.

However, the third source used for this essay is a scholarly research article published in a recent year, i.e., 2021.

Q4: How did you search for these sources? What was the process you went through to find the sources?

Answer:

For the first source, i.e., the book, I consulted the library to fetch the required information on the said topic. However, for the second reference, i.e., Wikipedia, I used www.google.com. Similarly, for the

research article, I again consulted www.google.com to search multiple sites and, at last, found my required article.

Q5: Is the topic of your paper controversial? Is it possible you would find conflicting information on this topic? Which of your sources would be more reliable for information, and how could you tell?

Answer:

No, the topic is not controversial. And I don't think that some conflicting information can be found regarding the topic as it is a factual-based scientific topic. However, I found the first source reliable because it is a book compiled in a detailed and comprehensive way.