WORLD JOURNAL OF PHARMACEUTICAL RESEARCH
SJIF Impact Factor 8.084
Volume 11, Issue 1, 2012-2015. Review Article ISSN 2277– 7105

PATHOGENESIS OF TYPHOID FEVER

***Sukmawati Eka Bima Sahputri**

Magister of Pharmacy, University of Surabaya, East Java, Indonesia.

Article Received on
28 November 2021,

Revised on 18 Dec. 2021,
Accepted on 08 Jan. 2022

DOI: 10.20959/wjpr20222-22923

***Corresponding Author**
Sukmawati Eka Bima Sahputri
Magister of Pharmacy, University of Surabaya, East Java, Indonesia.

ABSTRACT

Typhoid fever is most prevalent in the Asian part of the world especially in the developing countries of Asia. Typhoid fever is caused by caused by a gram-negative bacterium Salmonella typhi or Salmonella typhi germs. Salmonella bacteria produce endotoxin which is a lipopolysaccharide complex and is considered to play an important role in the pathogenesis of typhoid fever. It is an orally transmitted communicable disease caused by consuming contaminated food and impure water. Symptoms include high fever, rash, weakness, abdominal pain, and headache.

KEYWORDS: *Typhoid Fever, Salmonella Typhi, Salmonella Pathogenesis.*

INTRODUCTION

Typhoid fever causes 9.9 and 24.2 million cases and 75,000± 208,000 deaths per year.[1] Globally estimated infection as well as annual death rates of typhoid fever showed that it is a major death causing infectious disease in many underdeveloped areas of the world with 12–33 million cases and resulting into 0.216–0.600 million deaths, respectively.[2] Based on data provided by the World Health Organization, infections caused by S. Paratyphi A have been increasing in recent years and 90% of these typhoid deaths occur in Asia.[3] Typhoid fever is caused by Salmonella enterica, serovar Typhus (S. Typhi) and paratyphoid fever is caused by Salmonella enterica, serovar Paratyphoid (S. Paratyphi) A, B, or C, a gram-negative bacterium that invades the body via the small intestines and colonizes macrophages in the reticuloendothelial system.[1,4] Salmonella enterica serovars Typhi, Paratyphi A, Paratyphi B, and Paratyphi C may be referred to collectively as typhoidal Salmonella, whereas other serovars are grouped as nontyphoidal Salmonella (NTS). Humans are the only reservoir for these infections.[3,5] Typhoid fever is transmitted by ingestion of food, including dairy products, or water contaminated by excreta from patients or chronic by infected persons.

Usage of contaminated drinking water and food supplies with faecal wastes may be the basic source for the transmission in areas where it is highly prevalent.[2,5]

Epidemiology

The International Vaccine Institute evaluated that there were 11.9 million typhoid fever sicknesses and 129,000 passing in low-and center salary nations. Typhoid and paratyphoid fevers were included in the Global Burden of Disease project, when they were together estimated to account for 12.2 million disability-adjusted life years and 190,200 deaths.[6] The risk for infection is high in low- and middle- income countries where typhoidal Salmonella is endemic and that have poor sanitation and lack of access to safe food and water. Typhoid fever cases and deaths occur among populations without access to water, adequate sanitation, and hygienic facilities primarily in south Asia. Typhoidal Salmonella is transmitted through water or food contaminated with human feces. In the tropics enteric fever tends to be more common during the hot dry seasons when the concentration of bacteria in rivers increases, or in the rainy season if flooding distributes sewage to drinking water sources. For travelers the highest attack rates are associated with visit some countrie, although Indonesia has a reported annual incidence up to 1%, the attack rate for travellers is low.[7]

Bacteriology

Domain: Bacteria

Phylum: Proteobacteria

Class: Gammaproteobacteria

Order: Enterobacteriales

Family: Enterobacteriaceae

Genus: *Salmonella*

Specie: *Salmonella enterica*

Subspecies: *Salmonella enterica enterica*

Serovar: *Salmonella enterica serovar Typhi*

Salmonella typhi is a Gram-negative anaerobic bacillus with flagellat, facultatively possessing three major antigens: H or flagellar antigen; O or somatic antigen; and Vi antigen.[7,8]

Pathogenesis

Typhoid fever is caused by Salmonella typhi or Salmonella typhi germs. Transmission to humans through food and beverages contaminated with human feces. After passing through

the stomach germs until smooth and invasive to the lymphoid tissue (peyer plaque) which is a place for grow and development. Through the lymph channel (bacteremia) and reach endothelial reticulo cells from the liver and lymph, this phase is considered an incubation period (7-14 days).

Then from this tissue the germs are released into the systemic circulation and reach the body organs of the spleen, small intestine and gallbladder.[7]

Salmonella bacteria produce endotoxin which is a lipopolysaccharide complex and is considered to play an important role in the pathogenesis of typhoid fever. Endotoxin is pyrogenic and enlarges the inflammatory reaction in which Salmonella bacteria growth. In addition, it produces cytokines by macrophage cells and leukocytes in inflamed tissue. Cytokines are symptoms of toxemia (proinflammation). Because salmonella bacilli are intracellular, almost all parts of the body can be attacked and sometimes invaded tissue can develop infections.

The main pathological abnormality in the small intestine is the part of the distal that is provided by the peyer plaque. In the first week, when the peyer plaque occurs hyperpelasia continues into 2nd necrosis and at week 3, ulcers formed. This ulcer easily causes bleeding and perforation which is a dangerous complication. Liver defects due to infiltration of lymphocyte cells and other mononuclearcells. Similarly, this process occurs in other reticuloendothelial tissues. The same pathological abnormalities can be found in other organs such as bones, intestines, lungs, kidneys, heart and brain membranes. On clinical examination, inflammation and abscesses are often found in many organs, so bronchitis, septic arthritis, pyelonephritis, meningitis, etc. can be found.[9]

Sign and Symptomps

The symptom is the fever and rashes, the temperature rises gradually and may reaches a high plateau of 39°C to 40°C during the first week. The rash, which does not affect every patient, consists of rosecolored spots, particularly on the neck and abdomen. Other symptoms can include: malaise, headache abdominal pain, abdominal distension and other constitutional symptoms.[10,11]

CONCLUSION

Typhoid fever is caused by Salmonella typhi or Salmonella typhi germs. Transmission to humans through food and beverages contaminated with human feces. Salmonella bacteria produce endotoxin which is a lipopolysaccharide complex and is considered to play an important role in the pathogenesis of typhoid fever. Endotoxin is pyrogenic and enlarges the inflammatory reaction in which Salmonella bacteria growth. In addition, it produces cytokines by macrophage cells and leukocytes in inflamed tissue. Cytokines are symptoms of toxemia (proinflammation). The symptoms is fever, rash, malaise, headache abdominal pain, abdominal distension and other constitutional symptoms.

REFERENCES

1. Warren, J. L., Crawford, F. W. & Weinberger, D. M. The burden of typhoid fever in low- and middle-income countries : A meta-regression approach, 2017; 1–21. doi:10.1371/journal.pntd.0005376
2. Ali, Z., Adeeb, M. & Khan, A. A. Asian Pacific Journal of Tropical Disease Frequency of typhoid fever and its association with seasonal variations in Taxila, Pakistan. *Asian Pacific J. Trop. Dis.*, 2016; 6: 608–610.
3. Sztein, M. B., Salerno-goncalves, R. & Mcarthur, M. A. Complex adaptive immunity to enteric fevers in humans : lessons learned and the path forward, 2014; 5.
4. Crump, J. A., Gordon, M. A. & Parry, C. M. Salmonella Infections, 2015; 28: 901–937.
5. Prevalence and Epidemiological Findings of MDR (Multi- Drug Resistant) Typhoid bacillus in District Swat KPK, 2017; 4.
6. Ik, M. F. G. E. Y. Risk factors for typhoid fever among adult patients in Diyarbakir, Turkey, 2006; 612–616. doi:10.1017/S0950268805005583
7. Ugboko, H. & De, N. Review Article Mechanisms of Antibiotic resistance in Salmonella typhi, 2014; 3: 461–476.
8. Wangdi, T., Lee, C., Spees, A. M., Yu, C. & Kingsbury, D. D. The Vi Capsular Polysaccharide Enables Salmonella enterica Serovar Typhi to Evade Microbe-Guided Neutrophil Chemotaxis, 2014; 10.
9. Bula-rudas, F. J. Salmonella Infections in Childhood. *Adv. Pediatr*, 2015; 62: 29–58.
10. Sultana, S., Maruf, A. Al, Sultana, R. & Jahan, S. Bangladesh Journal of Infectious Diseases Laboratory Diagnosis of Enteric Fever : A Review Update, 2016; 3: 43–51.
11. Cunha, B. A., Gran, A. & Munoz-gomez, S. Typhoid fever vs. malaria in a febrile returning traveler : Typhomalaria revisited e An Oslerian perspective. *Travel Med. Infect. Dis.*, 2013; 11: 66–69.