Project On

A survey on cognition, knowledge and perception of Typhoid Fever among under graduate students

Submitted To

The Department of Pharmacy,

Faculty of Allied Health Sciences,

Daffodil International University

In the partial fulfillment of the requirements for the degree of Bachelor of Pharmacy

Submitted By

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APPROVAL

This Project A survey on cognition, knowledge and perception of Typhoid Fever among under graduate students, submitted to the Department of Pharmacy, Faculty of Allied Health Sciences, Daffodil International University, has been accepted as satisfactory for the partial fulfillment of the requirements for the degree of Bachelor of Pharmacy and approved as to its style and contents.

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DECLARATION

I, at this moment, announce that I am carrying out this project study under the supervision of "Mr. Shadhan Kumar Mondal," Lecturer, Department of Pharmacy, Faculty of Allied Health Sciences, Daffodil International University, Impartial Compliance with the Bachelor of Pharmacy Degree Requirement (B. Pharm). This project, I declare, is my original work. I also state that neither this project nor any part thereof has been submitted for the Bachelor's award or any degree elsewhere.

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DEDICATION

To friends & family

ABSTRACT

Salmonella Typhi is a bacterium that may cause the potentially fatal illness typhoid fever. Typically, contaminated food or water is how it is spread. Once consumed, Salmonella Typhi bacteria grow and spread throughout the bloodstream. There is a chance that urbanization and climate change may make typhoid more prevalent worldwide. Typhoid is also spreading more quickly in areas without access to clean water or proper sanitation because to the growing resistance to antibiotics. The survey starts out with an introduction and 12 relevant questions. 110 individuals, ranging in age from 20 to 110. This study was carried out at Ashulia, Savar, near the university. According to the study's findings, about 44% of participants had typhoid for longer than 20 days, 31% had typhoid for 20 days, and 25% had typhoid for 15 days. In this survey, about 70% of participants said they had experienced severe typhoid, and 30% said they had no connection to it. This work will support further studies in the same area.

Keywords: Antibiotics, Resistance, Salmonella, Ciprofloxacin.

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Introduction

1.1. Typhoid fever

Typhoid is a disease that is brought on by Salmonella bacteria of the serotype Typhi. It is more generally referred to as plain typhoid. Typhoid is also known as typhoid fever. [1] The symptoms may vary in intensity from moderate to severe, and they typically appear six to thirty days after being exposed to the illness. [2] A dangerously high temperature usually develops gradually over a period of many days. [3] Feelings of weakness, stomach discomfort, constipation, headaches, and moderate vomiting are a few of the typical side symptoms of this sickness. [4-5] There is a chance that some individuals may get a rash that resembles pink dots. Confusion may strike those who have a severe case of the sickness.

Fig 01: Salmonella

Without medical attention, the symptoms might last for many weeks or even months. Even though it only happens very infrequently, it might be quite severe. [5] Although some people may harbour the germs without displaying any signs of illness, they are nevertheless able to spread the disease to others. [6] Typhoid fever and paratyphoid fever both come under the one and only category of enteric fever. The name of the illness is derived from the typhoid bacteria. Enterica S. It is believed that Typhi can only spread among individuals and can only multiply within the bodies of those who already have the virus. [7] Salmonella enterica serovar, subspecies The bacterium that causes typhoid fever is referred to as typhi. Consuming contaminated food or water may spread this bacteria to other people. The intestines, payers patches, mesenteric lymph nodes, liver, gallbladder, bone marrow, and blood are all possible breeding habitats for this bacteria. The gallbladder is another place where it could be found. The most typical method of transmission of typhoid fever is by the consumption or drinking of food or water that has been contaminated with the faces of an infected person. The illness might spread in this method most often as well. Additional examples of risk factors include a lack of access to sufficient amounts of clean drinking water and poor sanitation. People who have not yet been exposed to the virus but consume food or drink that

has been contaminated by it have a higher risk of becoming ill than people who have already been exposed to it. This is due to the increased likelihood of consuming infected food or drinking water among people who have not yet been exposed to the virus. There is no known animal reservoir for the propagation of this illness; infection is only a potential in human hosts. Only humans can serve as hosts for an infection. A diagnosis of S. enterica Typhi infection may be made by either cultivating and identifying S. enterica Typhi from patient samples or by detecting an immune response to the virus in blood samples. Patient samples may be obtained using one of these techniques. The result could be the same if any of these two strategies is used. [8] Researchers have been successful in creating more specialised techniques for diagnostic testing in recent years. One of these techniques, which may be especially suggestive of typhoid fever, is the detection of changing abundances of extremely tiny molecules in the blood. These more recent breakthroughs were made feasible by recent developments in the area of large-scale data collection and processing. These more recent improvements would not have been achievable without these more recent breakthroughs. [9] The diagnostic tests that are readily accessible in regions of the globe where typhoid fever is most prevalent are relatively poor in both accuracy and specificity. In addition, the length of time required for a precise diagnosis, the rise in antibiotic resistance, and the cost of testing all present problems for healthcare systems with little funding. After receiving the typhoid vaccine, a person's chance of developing the illness within the first two years after the vaccination is reduced by 40% to 90%. [10] There is a chance that the immunisation will continue to work in some way for up to seven years after it has been administered. It is highly advised that those who are more likely to get the illness or who will be going to an area where it is common be vaccinated against it. Those who have received the disease vaccine will have a significantly reduced chance of developing the sickness. The availability of clean, drinkable water, the maintenance of strict standards of hygiene, and the frequent washing of hands are further preventative measures that may be performed to avoid the illness. It is essential that the ill person abstain from cooking for other people until it is known that the illness has been completely eliminated. This guideline must be adhered to indefinitely in order to totally eradicate the virus. Typhoid is treated using antibiotics, including third-generation cephalosporins, fluoroquinolones, and azithromycin as examples of specific antibiotic classes. The severity of the issue has increased due to the proliferation of bacteria that are resistant to a variety of antibiotics, which has also significantly increased the complexity of treating the issue. [11–12] In 2015, 12.5 million new

cases of typhoid fever were documented. As compared to the prior year, this figure climbed. These instances [included] a lot of deaths. [13] The country with the most confirmed instances of the illness is India. Young children make up the vast majority of those who have been diagnosed with this condition. Typhoid cases decreased in the industrialised world in the 1940s as a direct consequence of improvements in sanitation and a rise in the use of antibiotics. Throughout the entire decade, this was the situation. Approximately 400 new cases of typhoid fever are reported each year, and 6,000 people are thought to be infected with the illness in the United States. [14] It is estimated that it caused around 149,000 fatalities worldwide in the year 2015, which is a significant decline from the 181,000 deaths that it brought about in the year 1990. [15-16] It is hard to completely rule out the possibility that this would happen, but if medication is not given, there is a probability that the risk of death might rise to 20%. If therapy is administered, there is a one to 4% chance that side effects will manifest. Comparing typhus to other illnesses, it is an altogether distinct condition. [17] Even though they shared many symptoms and many characteristics, it wasn't until the 1800s that medical professionals realised they were two distinct disorders. The phrase "resembling typhus," which characterises the illness' signs and symptoms, is where the name "typhoid" first appeared. [18]

1.2. History

The earliest descriptions

At the time of the Peloponnesian War, there was an outbreak of typhoid fever, which is generally considered to have been the most likely cause of the plague that swept through Athens at that time. During the time of the conflict, the residents of Athens fled to a city that was walled in order to defend themselves from an assault by the Spartans. This city was called Milon. This large influx of people into a condensed area put a strain on the water supply and waste infrastructure, most likely resulting in filthy conditions as it became increasingly difficult to find fresh water and as it got more difficult to collect trash and transfer it beyond the city limits. This large influx of people into a condensed area caused a strain on the water supply and waste infrastructure. This significant inflow of people into a relatively small region put a burden on the infrastructure that was responsible for transporting waste away from the city. In 2006, an examination of the bones from a mass burial site in Athens that dates back to around the time of the plague (around 430 B.C.), revealed that fragments of DNA comparable to present day S. Typhi DNA were discovered. The

site dates back to around the time of the plague. The history of the area stretches back to the same era in which the outbreak took place. On the other hand, examples of diseases that are caused by bacteria include Yersinia pestis, which is also known as the plague; Rickettsia prowazekii, which is also known as typhus; Mycobacterium tuberculosis; the cowpox virus; and Bartonella henselae. It is widely believed that the Roman Emperor Augustus Caesar died from either typhoid illness or an abscess in his liver. It is also believed that the only reason he was able to survive was because he treated his fever with ice baths and cold compresses. This is the only reason why it is believed that he was able to survive. There is a memorial erected in honour of Antonius Musa, the Greek physician who was successful in treating the patient's illness. [19]

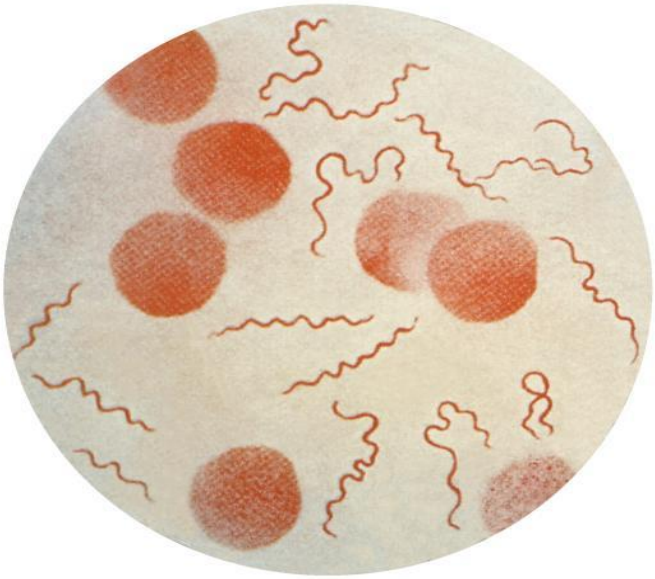

Fig 02: Rickettsia prowazekii

Definition and evidence of transmission

It is generally agreed that the French physicians Pierre-Fidele Bretonneau and Pierre-Charles-Alexandre Louis were the ones who first described typhoid fever as a distinct illness distinct from typhus. Both physicians carried out autopsy on people who had passed away in Paris as a result of fever, and their findings revealed that many of the deceased had lesions on the Peyer's patches. These lesions coincided with specific symptoms that the patients had been experiencing before to their passing. Because both typhoid and typhus were prevalent in Britain during that time period, medical professionals there had difficulty distinguishing between the two diseases. On the other hand, only typhoid was found prevalent and circulating among the populace in France. In addition, Pierre-Charles-Alexandre Louis conducted case studies and statistical analysis to prove that typhoid was infectious and that those who previously had the illness seemed to be protected from contracting it. After that, several American doctors confirmed these findings, and then Sir William Jenner convinced any remaining skeptics that typhoid is a specific disease recognizable by lesions in the Peyer's patches. He did this by examining sixty-six autopsies from fever patients and coming to the conclusion that the symptoms of headaches, diarrhea, rash spots, and abdominal pain were only present in patients who then had intestinal lesions after death. This further solidified the association of the disease with the. In the year 1847, William Budd became aware of an outbreak of typhoid fever in Clifton and discovered that all 13 of the town's inhabitants who had been infected with the illness received their water for drinking from the same well. It is important to note that this discovery was made two years before John Snow discovered that tainted water was the source of a cholera epidemic. Later on, Budd became the health officer of Bristol, where he oversaw the maintenance of a clean water supply and collected further evidence of typhoid as an infection transmitted by water throughout his career. [19-20]

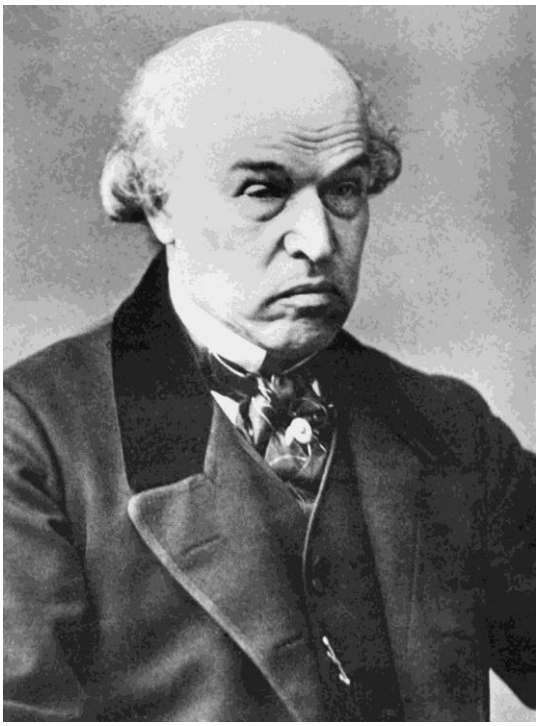

Fig 03: Sir William Jenner

1.3. Signs and symptoms

Traditionally, there are three phases of untreated typhoid fever, each one lasting approximately a week. These phases are characterized by the patient's gradual decline into exhaustion and malnutrition. [21]

- A low heart rate (Faget sign), a general feeling of malaise, a headache, and a cough accompany intermittent fever in the first week. Epistaxis, or nosebleeds, occur in 25% of cases, and gastrointestinal discomfort may also occur. Blood cultures are positive for Salmonella enterica subsp. enterica serovar Typhi and show a reduction in the number of white blood cells circulating (leukopenia) along with eosinopenia and relative lymphocytosis. The results of the Widal test are often unfavorable. [22]

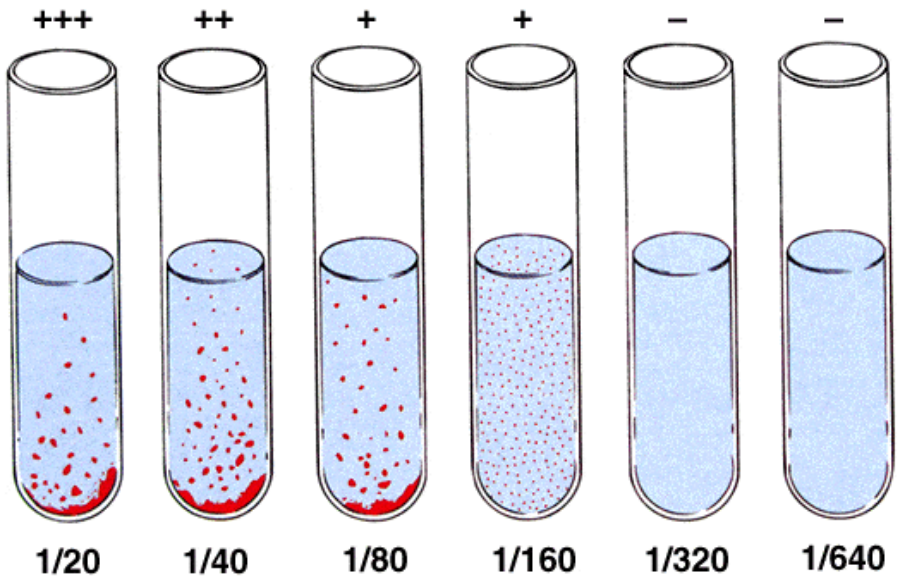

Fig 04: Widal test

- In the second week, the patient often has a dicrotic pulse wave, is too weak to get out of bed, and has a high temperature in plateau around 40 °C (104 °F). This is known as the sphygmothermic dissociation sign or the Faget sign. Patients with delirium may display a range of symptoms, from relative calm to increased agitation. Typhoid has been dubbed "nervous fever" because of the delirium it causes. About a third of people get rose patches

on their lower chest and belly. The lower regions of the lungs produce rhonchi (rattling breathing noises). There's a rumbling sound coming from the right bottom region of the stomach, and it's swollen and uncomfortable.Constipation is more prevalent than diarrhea at this time, however diarrhea is possible. Transaminases in the liver are increased, and both the spleen and liver are enlarged and painful (hepatosplenomegaly). Strongly positive antiO and antiH antibodies in the Widal test. A positive blood culture result is not always a sure thing.

- Several issues related to typhoid fever might arise during the third week:

✓ Over the course of 24 hours, there has been relatively little variation in the temperature. The patient becomes disoriented, dehydrated, and malnourished. It causes a macular rash on the trunk in one-third of those who get it.

✓ Hemorrhage in the intestines from clogged Peyer's patches is a potentially life-threatening condition.

✓ A distal ileal perforation is a catastrophic consequence that often results in death. When septicemia or widespread peritonitis starts in, there may be no outward signs of the condition's presence.

✓ Chronic obstructive pulmonary disease (COPD), asthma, and other lung conditions

✓ Encephalitis

✓ Behaviors indicative of neuropsychiatric disorders, such as mumbling delirium, coma vigil, and plucking at bedsheets or made-up items.

✓ Cholecystitis, endocarditis, osteitis, and metastatic abscesses are all possible complications of this infection.

✓ Thrombocytopenia, or a low platelet count, may occur.[23]

1.4. Causes

Bacteria

Salmonella enterica subsp. enterica serovar The Gram-negative bacteria known as Typhi are the organisms responsible for the spread of typhoid fever. The MLST subtyping method recognizes two primary sequence kinds of S. Typhi; these types, known as ST1 and ST2, are able to be found in different parts of the globe. [24] According to the findings of a phylogeographic research of drug resistance all across the world, the most prevalent haplotype is 58, also known as H58. The

spread of this haplotype, which most likely originated in India in the late 1980s and is now occurring all over the globe, [25] In 2016, researchers introduced a more comprehensive method of genotyping, which is currently in general use. According to these standards, the H58 genotype is now known as the 4.3.1 genotype. [26]

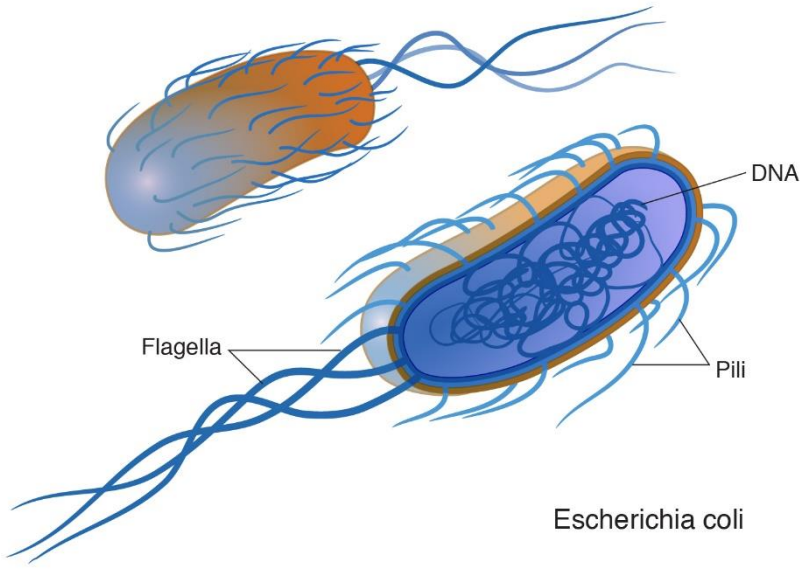

Fig 05: Bacteria

Transmission

In contrast to other strains of Salmonella, it does not appear that typhoid can be transmitted from animals in any of the ways that are currently understood. At this point in time, it is thought that the infection that causes this illness can only be contracted by human beings. Salmonella enterica serovar Enteritidis The fecal-oral pathway is a potential method of transmission for Typhi for both patients who are experiencing symptoms of the infection as well as those who are carriers of the infection but are not experiencing any symptoms themselves. If a person has not shown any signs of typhoid illness despite the fact that they have continued to excrete typhoid germs in their faeces for at least one year after the acute stage of infection, then that person is considered to be a human carrier of typhoid. Human carriers of typhoid are responsible for transmitting the disease to other people. [27]

1.5. Diagnosis

Cultures taken from blood, bone marrow, or stool, in addition to the Widal test, are used to make a diagnosis (demonstration of antibodies against Salmonella antigens O-somatic and H-flagellar). After ruling out malaria, dysentery, or pneumonia in less developed nations or areas experiencing epidemics, a therapeutic trial period with chloramphenicol is often conducted while waiting for the results of the Widal test as well as blood and stool cultures. [28]

Widal test

Through the utilization of antigen-antibody interactions, the Widal test is able to detect particular antibodies that are present in the serum of individuals who have typhoid.In this particular test, the serum is combined with a bacterial suspension of salmonella that has been killed and has a particular antigen. If the patient's blood includes antibodies that are effective against certain antigens, the antibodies will attach themselves to the antigens and cause them to cluster together. The results of the test are considered negative if clumping does not take place. The Widal test takes a considerable amount of time and has a high rate of major false positives. It is also possible for newly infected patients to get a false negative result. However, in contrast to the Typhidot test, the Widal test provides quantitative information on the material in the form of titres. [29]

Rapid diagnostic tests

Tests like Tubex, Typhidot, and Test-It, which are considered to be rapid diagnostic tests, have demonstrated only modest diagnostic accuracy.[30]

Typhi dot

The presence of specific IgM and IgG antibodies to a certain 50Kd OMP antigen is required for the Typhi dot test to be valid. In this test, a particular S. typhi outer membrane protein is bonded to a cellulose nitrate membrane in the form of fixed test lines. The membrane is then subjected to the test. It recognizes IgM antibodies and IgG antibodies in a distinct manner. IgM indicates a recent infection, whereas IgG indicates a more distant infection. Colloidal gold-anti-human IgG or gold-anti-human IgM is included on the sample pad that comes with this kit. The antigens will react and become red if the sample includes IgG and IgM antibodies that are specific to the target

antigens. Within two to three days of infection, a positive result will appear on the typhi dot test.A favorable result is indicated by the presence of two colored bands. A negative result is shown by the presence of a single control band. An invalid test is indicated by either a single initial fixed line or the absence of any band. The fact that Typhidot can only provide either positive or negative information is its most significant drawback. [31]

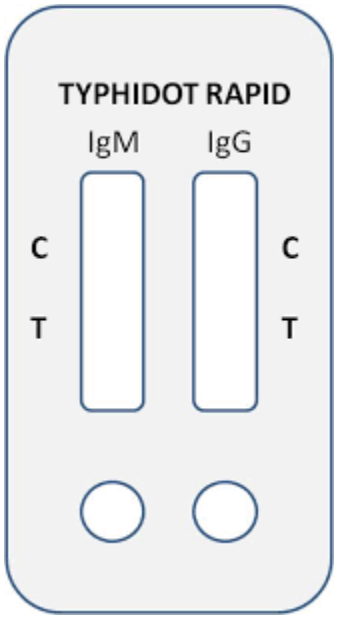

Fig 06: Typhidot rapid test

Test for tubex

Both brown magnetic particles coated with antigen and blue indicator particles coated with O9 antibody are found in the Tubex test. Both kinds of particles are coated with their respective antibodies. If the serum contains antibodies, those antibodies will bind to the brown magnetic particles during the test, causing those particles to sink to the bottom of the container. Meanwhile, the blue indicator particles will remain in the solution, causing the color of the solution to turn blue. This indicates that the test was successful.If there is no antibody present in the serum, the blue particles will bind to the brown particles and sink to the bottom, resulting in a colorless solution. This indicates that the test was negative.[32]

1.6. Stages of typhoid fever

The symptoms of typhoid fever might appear gradually, in a progression of four phases. Treatment with antibiotics at an early stage helps prevent the disease from advancing to a later stage.

Stage 1. The incubation period for stage 1 typhoid fever ranges from five to fourteen days following the first exposure to S. Typhi. Symptoms of stage 1 typhoid fever include: The first sign is a temperature that gradually becomes higher over the course of a few days; this kind of fever is referred to as "stepwise" since it rises in stages. During this stage, the germs are making their way into your bloodstream.

Stage 2. In the middle of the second week of having a fever, the bacteria that are present in your Peyer's patches begin to grow (part of your immune system that identifies harmful invaders). You may have abdominal discomfort along with other gastrointestinal symptoms, such as diarrhea or constipation, when this condition first begins. You can get something called "rose spots," which are little pink dots that seem like a rash and appear on your skin.

Stage 3. Around the third week following the onset of your symptoms, if you do not get antibiotic treatment, the germs may cause significant harm if they are not stopped. Some patients have life-threatening consequences, such as internal bleeding and encephalitis (inflammation in your brain).

Stage 4. The fourth stage, or stage four, is when the majority of patients start to feel better. The high temperature you've been experiencing starts to come down. Because S. Typhi may exist in your gallbladder without generating symptoms, it is possible that you might still be infectious even after you have started to feel better.[33-34]

1.7. Complications of typhoid

If you fail to get treatment for typhoid, you put yourself at risk for a number of serious sequelae, including the following:

- ✓ Bruising and bleeding within.
- ✓ Perforation of the intestinal lining (a hole in your intestines).
- ✓ Swollen or ruptured gallbladder.
- ✓ Symptoms related to the nervous system or brain, such as disorientation, delirium, and seizures
- ✓ Increasing pressure around your head (meningitis).

- ✓ Respiratory conditions such as bronchitis, pneumonia, and others
- ✓ Bone inflammation (osteomyelitis).
- ✓ Inflammation of the heart
- ✓ Failure of the kidneys
- ✓ Miscarriage.

1.8. Prevention

Sanitation and hygiene are very vital in the fight against typhoid fever. Only in settings where human feces have the potential to come into touch with food or water does it have the potential to spread. Typhoid fever may be avoided by practicing proper food hygiene and washing one's hands often. The development of industry was a significant factor in the eradication of typhoid fever. This was because industrialization removed the potential threats to public health that were posed by the presence of horse manure in public streets. [31] Horse manure was a breeding ground for a large number of flies, which served as vectors for a wide variety of infectious agents, including Salmonella species. [32] The chlorination of drinking water has reportedly resulted in significant reductions in the spread of typhoid fever, as shown by data compiled by the Centers for Disease Control and Prevention in the United States. [33]

Vaccination

The live, oral Ty21a vaccine (which is marketed and sold under the brand name Vivotif by Crucell Switzerland AG) and the injectable typhoid polysaccharide vaccine are the two typhoid vaccines that have been approved for use in the prevention of typhoid (sold as Typhim Vi by Sanofi Pasteur and Typherix by GlaxoSmithKline). Both are effective in preventing typhoid and are suggested for anyone traveling to regions where the disease is common. In the case of the oral vaccination, booster shots should be given every five years, while the injectable vaccine should be administered every two years. In places where the more recent formulations are not accessible, an earlier vaccination containing killed whole cells is still used; however, the use of this vaccine is no longer advised since it is associated with a greater risk of adverse effects (mainly pain and inflammation at the site of the injection). [34] Beginning in 1999, the World Health Organization (WHO) supported the implementation of a vaccination campaign in order to assist in the reduction of the prevalence of typhoid fever in underdeveloped countries. Vaccination has been shown to be

efficient in controlling outbreaks in high-incidence regions, and it is also highly cost-effective; the price of a single dosage of vaccine is often less than one dollar in the United States. Communities who are already struggling financially are more likely to take advantage of the immunizations as a result of the affordable cost. Vaccination programs for typhoid have been shown to be successful, but they are not sufficient to eradicate typhoid disease on their own. [35] The only method that has been shown to be effective in preventing the spread of this illness is to use vaccinations in conjunction with other public health measures. Two different vaccinations for typhoid fever have been suggested by the World Health Organization (WHO) since the 1990s. The ViPS vaccination is administered through injection, whereas the Ty21a vaccine is taken orally in capsule form. The ViPS vaccine should only be administered to persons who are at least two years old, and it should be repeated every two to three years for it to be effective between 55 and 72 percent of the time. People aged five and older are encouraged to have the Ty21a vaccination, which is effective between 51% and 67% of the time for a duration of 5–7 years. Both vaccinations have been shown to be both safe and effective in preventing pandemic illness across a variety of geographic areas. There is also a variant of the vaccine that is administered in conjunction with a hepatitis A vaccination.[36] In December 2019, the findings of a phase 3 study of the typhoid conjugate vaccine (TCV) indicated an 81% reduction in the number of illnesses among children.[38-39]

Treatment

Oral rehydration therapy

Oral rehydration therapy, which was rediscovered in the 1960s, offered a straightforward approach to reducing the number of fatalities associated with diarrheal disorders in general.[39]

Antibiotics

Antibiotic treatment with a fluoroquinolone, such as ciprofloxacin, is the treatment of choice in settings where there is a low prevalence of drug resistance. This is because fluoroquinolones inhibit the development of drug-resistant bacteria. [40-41] Cephalosporin antibiotics from the third generation, such as ceftriaxone or cefotaxime, are the most effective course of treatment for any condition that is not addressed by the previous two categories. [42-45] Oral administration of cefixime is an alternate therapeutic strategy that has the potential to be effective. [46-47] Typhoid fever nearly seldom results in mortality in otherwise healthy people who are treated with the

appropriate medical care. Antibiotics such as amoxicillin, ciprofloxacin, ampicillin, chloramphenicol, trimethoprim-sulfamethoxazole, and trimethoprim-sulfamethoxazole have traditionally been used to treat the condition. However, newer antibiotics, such as trimethoprim-sulfamethoxazole, have been shown to be more effective. Yet, it has been demonstrated that more recent antibiotics, such as trimethoprim-sulfamethoxazole, are more effective than older ones. [48] Antibiotic treatment results in a decrease of the case fatality rate by approximately one percent. This drop is due to the killing of fewer patients. [49] In the case that certain people do not receive therapy, they may develop symptoms such as a fever that lasts for an extended period of time, bradycardia, hepatosplenomegaly, gastrointestinal issues, and even pneumonia. Individuals with white skin have up to a twenty percent chance of developing pink spots on the skin of their trunks. These patches can appear anywhere on the patient's body. When pressure is given to the area that is being impacted, these patches disappear. Patients who have not received treatment and are in their third week of illness have a greatly greater risk of experiencing problems with both their digestive system and their brain. There is a 10%–20% probability that the patient will pass away as a direct result of these problems. Children under the age of four, particularly those under the age of two, had the greatest known case fatality rates due to the disease. Even after the symptoms of typhoid fever have faded, bacteria can continue to grow and thrive in the biliary system because it is a warm and moist environment. As a direct consequence of this, it is estimated that between 2% and 5% of individuals who have previously been diagnosed with the condition are regarded to be chronic carriers of the infection. [50]

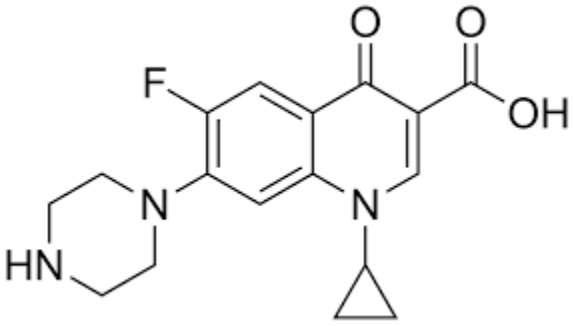

Fig 07: Ciprofloxacin chemical structure

Surgery

When an intestinal perforation occurs, surgery is frequently the recommended course of treatment because it is the next stage in the treatment process. According to the conclusions of one study, the countries with the fewest resources are the ones that are most responsible for bearing the burden of the disease. In these nations, the risk of death within the first 30 days following surgery was found to be 9% (8/88), while the rate of surgical site infections was found to be 67% (59/88). Both of these rates are much higher than the global average. [51] The vast majority of surgeons believe that the most successful technique of surgical treatment comprises doing nothing more than sewing up the perforation and draining the peritoneum. This view is held by the vast majority of doctors. Those who have had repeated perforations in their intestines may benefit from having their small intestines removed surgically if they are candidates for the procedure. In the event that eradicating hepatobiliary carriage by the use of antibiotic treatment is not possible, gallbladder removal through surgical means should be considered. It is possible for cholecystectomy to be successful, particularly in persons who have gallstones; nevertheless, it does not always succeed in eradicating the carrier status due to lingering hepatic infection. Gallstones are a common cause of discomfort associated with cholecystectomy. Cholecystectomy has a chance of being effective for patients who suffer from gallstones. Even in patients who do not have gallstones, the cholecystectomy treatment has a chance of being effective because it removes the gallbladder. [52-53]

Resistance

As a result of the widespread prevalence of resistance to ampicillin, chloramphenicol, trimethoprim-sulfamethoxazole, and streptomycin, these antibiotics are no longer considered to be effective first-line treatments for typhoid fever. Instead, other antibiotics are now considered to be more appropriate options. This is because resistance to these medicines has spread throughout the world to such an alarming degree. [54] A typhoid fever sickness that is resistant to more than one medicine is described as having the condition known as multidrug-resistant typhoid. [55] The growing prevalence of bacteria that are resistant to the antibiotic ciprofloxacin is a growing cause for concern across the globe, but it is of particular significance in Southeast Asia and the Indian subcontinent. This is because these regions have the highest rates of ciprofloxacin resistance. In many hospitals, the antibiotic ciprofloxacin is being replaced by the antibiotic ceftriaxone as the primary treatment for suspected cases of typhoid fever originating in South America, India,

Pakistan, Bangladesh, Thailand, or Vietnam. This change is being made because ceftriaxone has been shown to be more effective against typhoid fever. This shift is occurring because the bacteria have developed a resistance to the antibiotic ciprofloxacin. Also, it has been indicated that azithromycin is preferable to fluoroquinolone drugs and ceftriaxone in terms of its efficacy in treating typhoid that is resistant to therapy. This is based on the fact that azithromycin kills more bacteria than ceftriaxone does. This is because azithromycin is more effective than other antibiotics at eliminating the germs that cause typhoid. Azithromycin can be taken orally and is less expensive than ceftriaxone. However, ceftriaxone is the more expensive option. Ceftriaxone is often administered in the form of an injection. [56] The testing in the laboratory to determine whether or not an organism is susceptible to ciprofloxacin is a different issue that has been minimised. The most recent recommendations state that it is suggested that clinical isolates be evaluated simultaneously for resistance to ciprofloxacin (CIP) and nalidixic acid. This recommendation comes from the American Society for Microbiology (NAL). Isolates that are susceptible to both ciprofloxacin and nalidixic acid should be reported as "sensitive to ciprofloxacin." On the other hand, isolates that are susceptible to ciprofloxacin but not nalidixic acid should be recorded as having "reduced sensitivity to ciprofloxacin." However, according to the findings of a study that analysed 271 different isolates, approximately 18 percent of the isolates that had a reduced sensitivity to fluoroquinolones, the class of antibiotics to which CIP belongs (MIC 0.125–1.0 mg/L), would not be detected by this method. This was determined based on the findings of the study that analysed the different isolates. Following an examination of the findings of the investigation, the researchers arrived at this conclusion. [57]

Article Review

2.1. Khanam, F., Sayeed, M. A., Choudhury, F. K., Sheikh, A., Ahmed, D., Goswami, D., ... & Qadri, F. (2015). Typhoid fever in young children in Bangladesh: clinical findings, antibiotic susceptibility pattern and immune responses. PLoS neglected tropical diseases, 9(4), e0003619.

The majority of cases of typhoid fever caused by Salmonella enterica serotype Typhi (S. Typhi) in endemic areas are in young children under the age of five. We investigated the mucosal and systemic immune responses in young children with S. Typhi bacteremia by measuring the IgA response in lymphocyte culture secretion and the IgA, IgG, and IgM responses in plasma using ELISA (aged, 1 to 5 years). In order to assess the T cell proliferation, we also performed a 3H-thymidine incorporation assay. Age-matched healthy controls and older children (ages 6 to 17) and adults (ages 18 to 59) with S. Typhi bacteremia were used as the comparison groups (HC). Younger children, older children, and adults all have comparable effects on their lymphocyte discharges during the beginning of illness. Young children and adults do not have the same plasma antibody responses to MP. T cell proliferative responses increased late in the convalescence phase across all age groups. Among age groups, the clinical profile remained constant. Nevertheless, neither the clinical symptoms nor the immunological reactions are significantly impacted by the establishment of MDR S. Typhi strains in young neonates. This study shows that the immune response to naturally occurring disorders may occur in both young newborns and adults.

2.2. Brooks, W. A., Hossain, A., Goswami, D., Sharmeen, A. T., Nahar, K., Alam, K.,& Breiman, R. F. (2005). Bacteremic typhoid fever in children in an urban slum, Bangladesh. Emerging infectious diseases, 11(2), 326.

Throughout the course of fever surveillance in an urban slum in Dhaka, we were able to determine that there were 3,9 cases of bacteremic typhoid fever per 1,000 person-years. The relative risk for preschool-aged children was 8.9 times that of older individuals. Our regression model suggested that these children were clinically ill, highlighting the significance of immunisation in early childhood settings.

2.3. Saha, S. K., Baqui, A. H., Hanif, M., Darmstadt, G. L., Ruhulamin, M., Nagatake, T., ... & Black, R. E. (2001). Typhoid fever in Bangladesh: implications for vaccination policy. The Pediatric infectious disease journal, 20(5), 521-524.

There was an 11.6% frequency of bacterial infections in the blood of 538 of the 4,650 persons that were examined. S. typhi was the most frequent pathogen discovered, accounting for almost three-quarters (391 of 538) of the isolates. The isolation rate of S. typhi was observed to be highest during the summer and monsoon seasons and lowest during the winter months. The majority of S. typhi isolates were from children less than 5 years old (54.5 percent; 213 of 391), and 27 percent of the isolates were from infants and toddlers (105.1 percent; 105 of 391). The percentage of social isolation was highest during the second year of life (17.4%, or 68 out of 486). The amount of bacteria in blood, as measured in colony-forming units per milliliter of blood and split down by age group, correlated negatively with advancing age.

Goal of my studies

There is a substantial risk to the general population's health in Bangladesh due to typhoid fever. Salmonella typhi is a bacterium that may be found in contaminated food or water, and it can also be spread from one person to another. This bacterium is the culprit behind many cases of foodborne illness. As a consequence of the nation's limited access to clean water and poor sanitation infrastructure, as well as the people's lackluster dedication to basic hygiene practices, Bangladesh is especially prone to the development of typhoid. This makes the country one of the country's most at risk for the disease.

My aim of this studies,

a) To determine the primary cause of typhoid's proliferation in Bangladesh.
b) To obtain information about the current treatment.
c) To discover what others, believe, inquire with them.
d) To comprehend the difficulties this condition presents.
e) To herald in a brand-new era of scholarly excellence.

Methodology

4.1. Target Population:

The survey begins with an overview and 12 pertinent questions. 110 people with ages ranging begins from 20 years old. This research was conducted in the University area, Ashulia, Savar.

4.2. Research Design:

The goal of this survey was to find out how people felt about the severity of typhoid fever and how it affects their health and happiness in their lives. The survey's target population was extended an invitation to take part in the field research, in which they would be expected to provide in-person responses to each and every inquiry.

4.3. Method of Data Analysis:

After an assortment of information, all information was checked for precision and internal consistency to deny missing or clashing data, and those were discarded. Information investigation was done through Microsoft's dominant refreshed rendition.

4.4. Ethical Considerations:

Before beginning the information assortment, educated verbal permission was taken from the investigation members. The obscurity of the respondents was kept private, and study subjects were educated that they could have the option to leave the program at any.

4.5. Survey Question

1. Patient Name ……..

2. Gender

- Male
- Female
- Others
-

3. Do you know about Typhoid?

- Yes
- No

4. Did you suffer from Typhoid?

- Yes
- No

5. How long have you suffered from Typhoid?

- 15 days
- 20 days
- More than 20 days

6. What do you think about the cause of Typhoid?

- Contaminated water, food
- Using public toilet
- All of this

7. Do you ever suffer the severity of Typhoid?

- Yes
- No

8. Which symptoms you have suffered most for Typhoid beside fever?

- Abdominal pain
- Weakness
- Loss of appetite
- All of this

9. Do you know about the microorganism of typhoid?

- Yes
- No

10. Which type of medical therapy do you take for typhoid?

- Antipyretic
- Intravenous fluid

- Antibiotics
- All of this

11. Did you Drink untreated water before two days of fever?

- Yes
- No

12. Did you Participated in swimming before two days of fever?

- Yes
- No

Result and Discussion

5.1. Gender of respondents

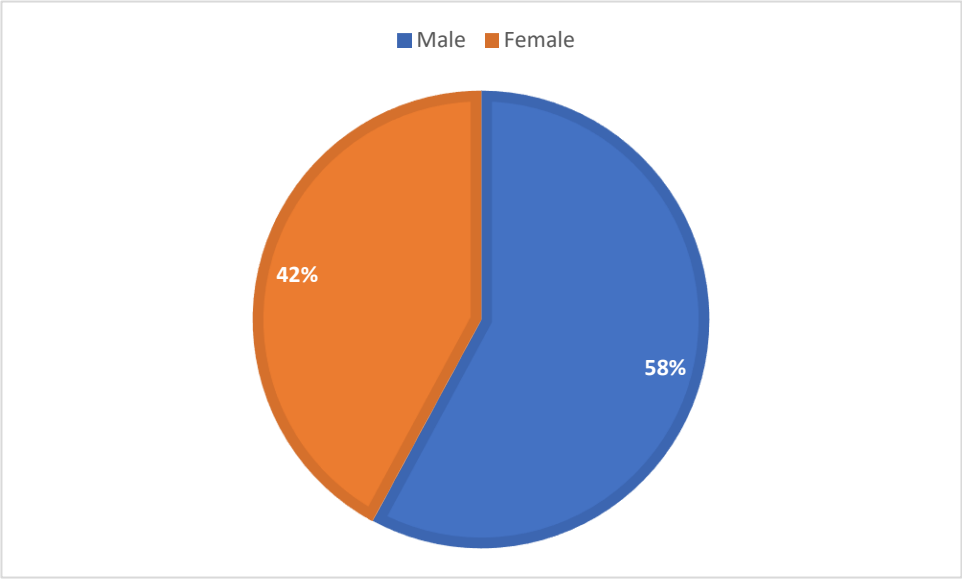

Fig 8: Gender

In this survey around 58% respondents are male and 42% respondents are female. Males' rates are higher than female.

5.2. Knowledge about Typhoid

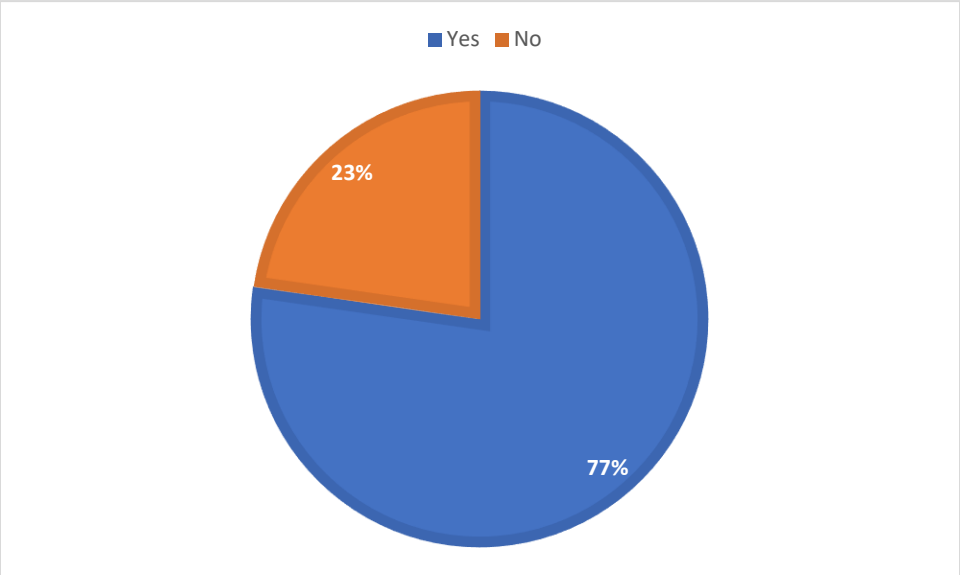

Fig 9: Knowledge about Typhoid

According to this survey around 77% participants has knowledge about S. Typhoid and another 23% respondents has no knowledge about that.

5.3. Suffering from typhoid

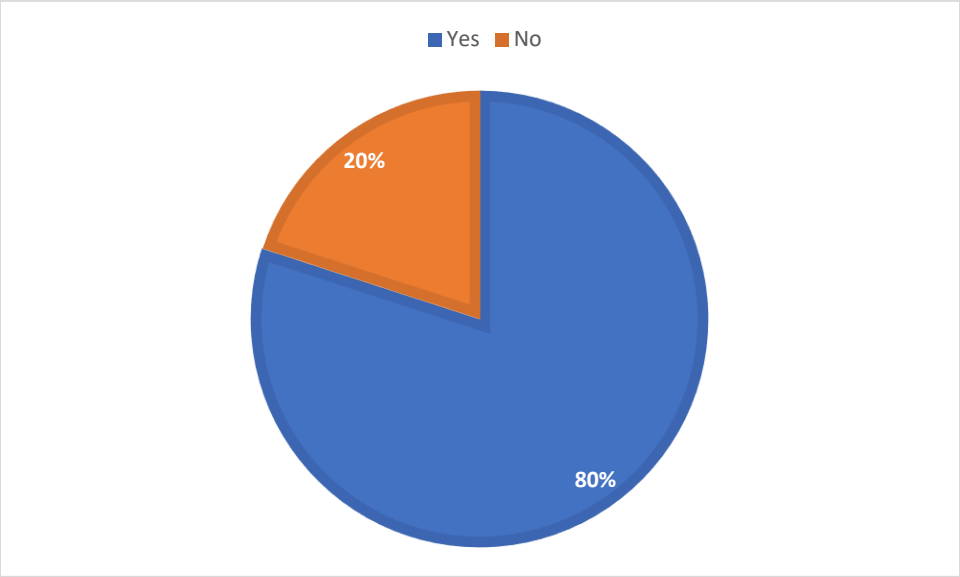

Fig 10: Suffering from typhoid

In this survey, over 80% of respondents had previously been diagnosed with typhoid, whereas the remaining 20% had not received a diagnosis and hence are unsure.

5.4. Duration of suffering from Typhoid

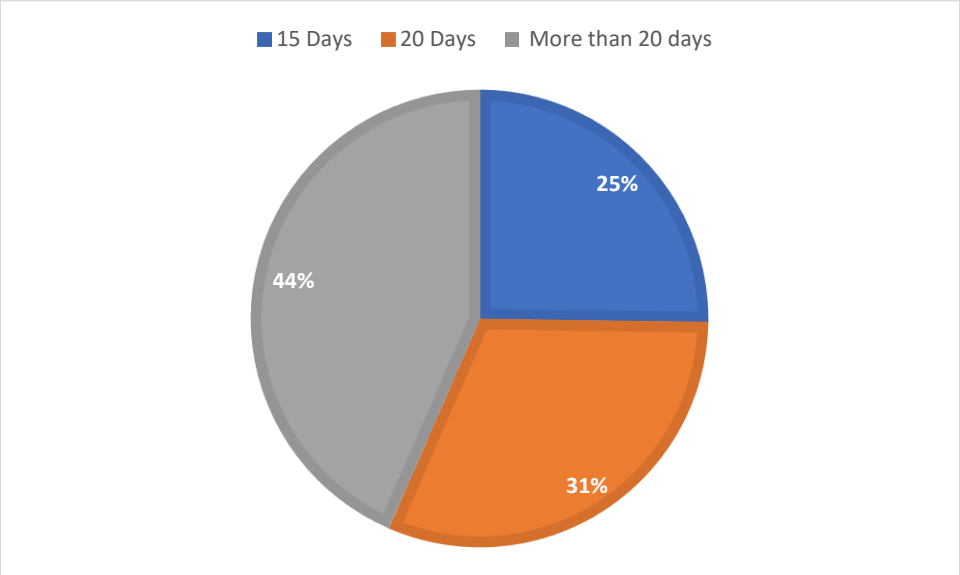

Fig 11: Duration of suffering from Typhoid

According to the findings of this study, around 44% of participants had been afflicted with typhoid for more than 20 days, 31% of participants had been afflicted with typhoid for 20 days, and 25% of participants had been afflicted with typhoid for 15 days.

5.5. Cause of Typhoid

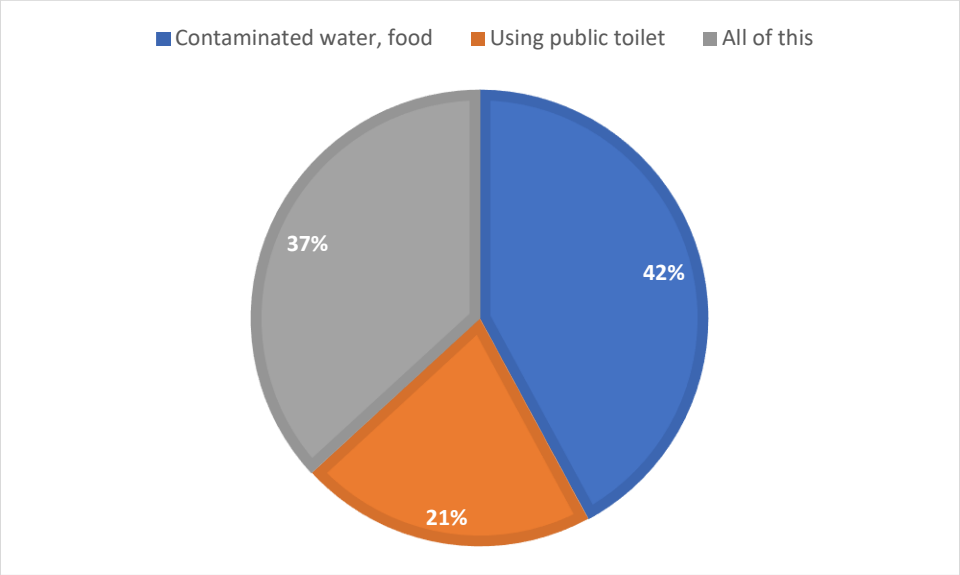

Fig 12: Cause of Typhoid

The findings of this survey indicate that 42% of respondents believe that typhoid is caused by drinking contaminated water and eating contaminated food, while 21% of respondents believe that using public toilets is the cause of typhoid, and 37% of respondents believe that all of these factors cause typhoid.

5.6. Suffering from the severity of typhoid

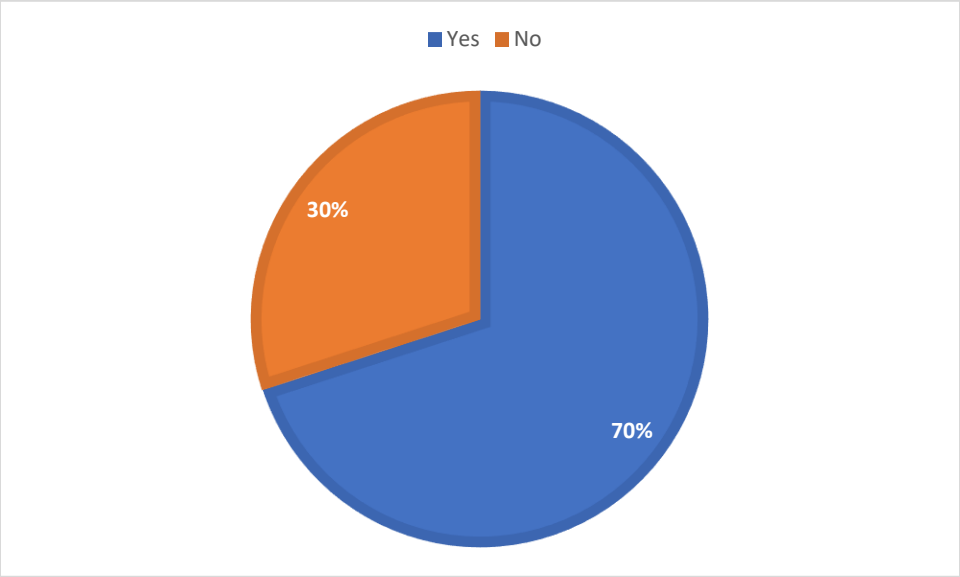

Fig 13: Suffering from the severity of typhoid

According to this survey around 70% participants they have suffered from the severe typhoid and 30% had no relation with that.

5.7. Symptoms of Typhoid beside fever

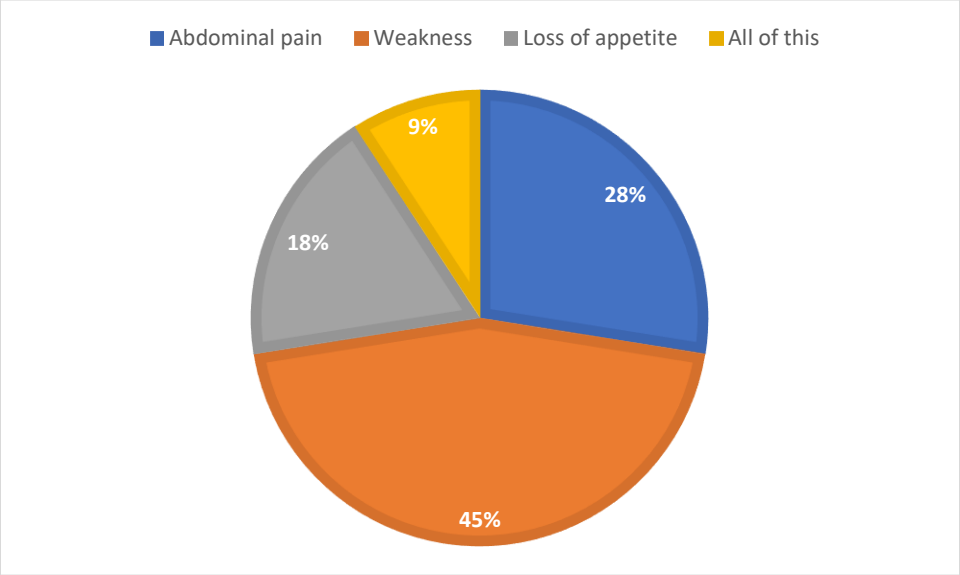

Fig 14: Symptoms of Typhoid beside fever

This research found that almost 45 percent of people who participated in the survey reported having weakness in addition to fever, 28 percent said they had abdominal discomfort in addition to typhoid, 18 percent said they had lost their appetite in addition to fever, and 9 percent reported having all of these symptoms in addition to fever.

5.8. Knowledge about Microorganism of Typhoid

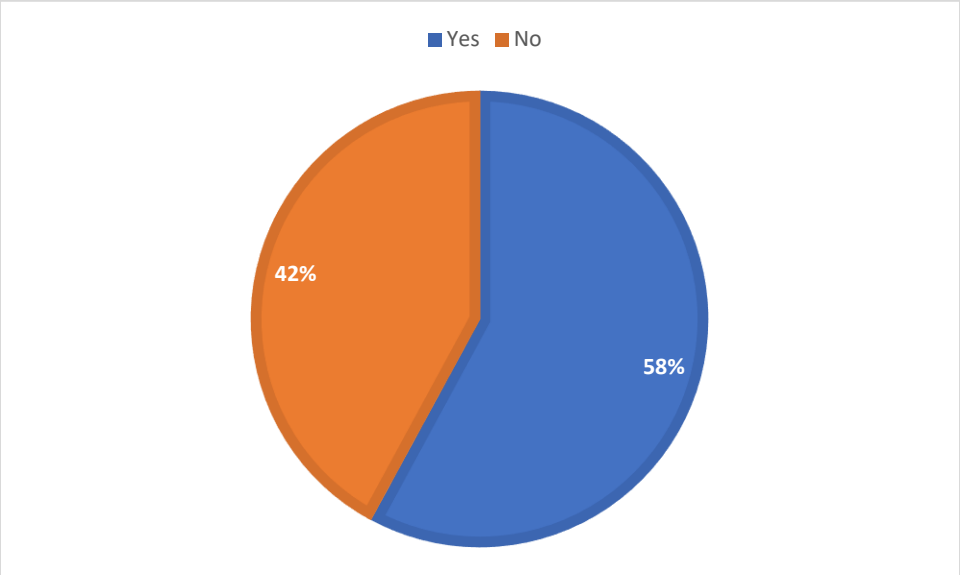

Fig 15: Knowledge about Microorganism of Typhoid

According to this survey around 58% participants has knowledge about microorganism of typhoid and another 42% has no knowledge about that.

5.9. Treatment for typhoid

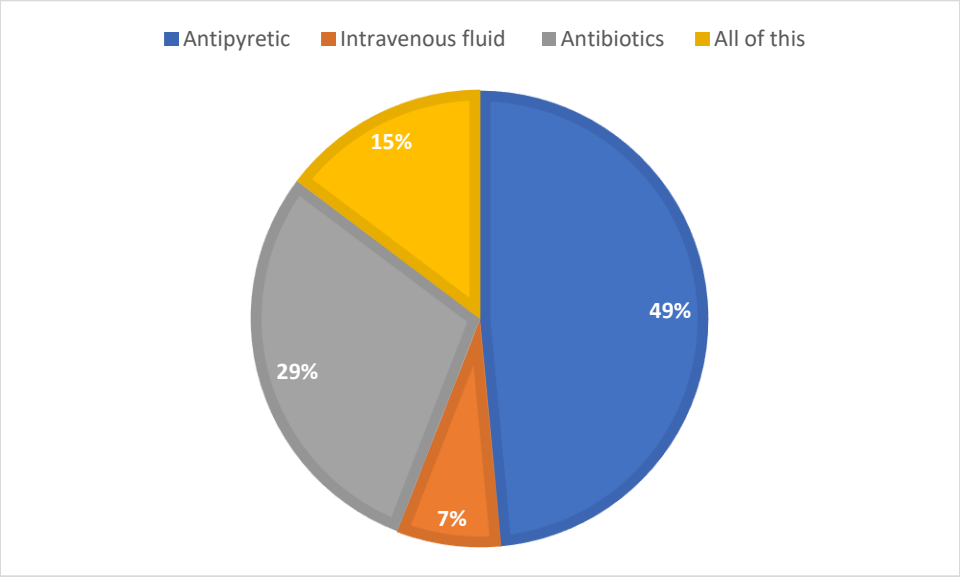

Fig 16: Treatment for typhoid

As part of their treatment for typhoid, around 49% of respondents reported using antipyretics, 29% reported using antibiotics, 15% reported using all of these therapies, and 7% reported using IV fluids.

5.10. Drink untreated water before two days of fever

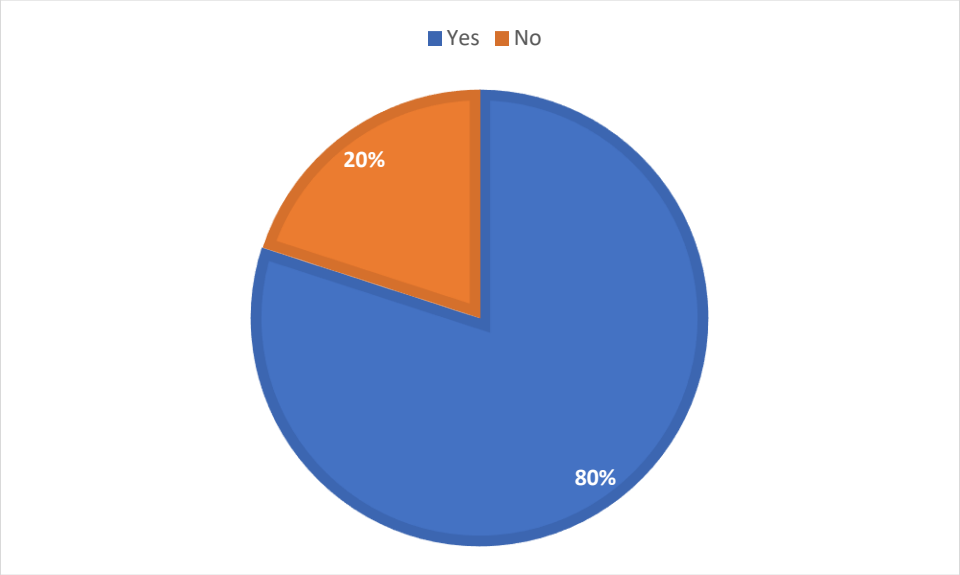

Fig 17: Drink untreated water before two days of fever

In this survey, almost 80% of subjects claimed to have drunk untreated water before experiencing two days of fever, while 20% were unable to recall.

5.10. Participated in swimming before two days of fever

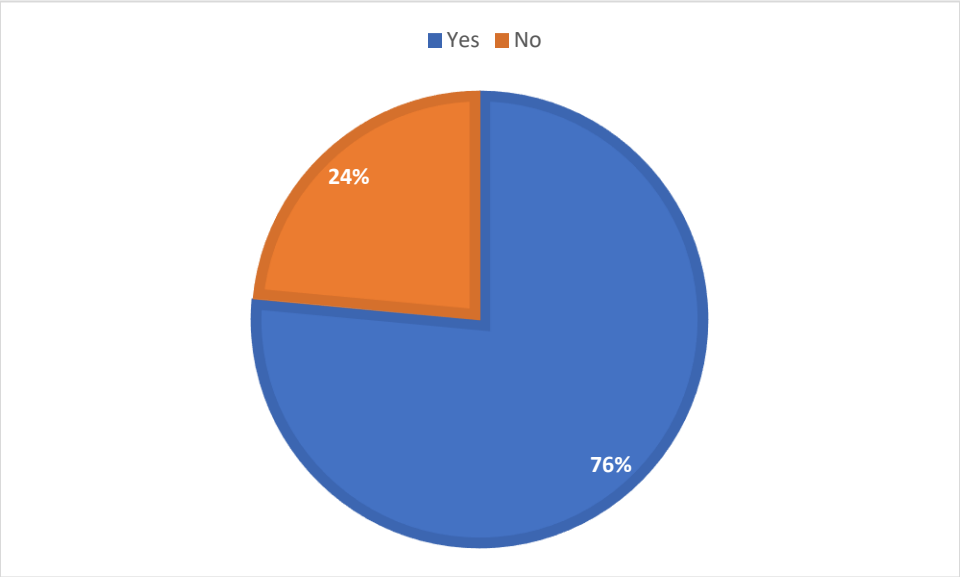

Fig 18: Participated in swimming before two days of fever

Around 76% of individuals in this study claimed to have swum prior to two days of fever, while 24% could not remember.

Conclusion

Salmonella typhi can be transmitted from one individual to another through the consumption of contaminated food or water. Children are more susceptible to typhoid than adults due to their immature immune systems. Among the symptoms are a fever, a headache, fatigue, a decrease in appetite, and abdominal pain. In the most severe circumstances, complications such as intestinal perforation or meningitis may result. In order for children in Bangladesh to avoid contracting typhoid, they must have access to pure water, adequate sanitation, and healthy hygiene practices such as frequent hand cleansing. Antibiotics are frequently used to treat typhoid fever, but prompt diagnosis and treatment are essential for minimizing the risk of complications and ensuring a full recovery.

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