

Malaria

→ What is malaria?

Malaria is the World largest parasitic disease, killing more people than any other communicable disease except Tuberculosis. Each year 300-500 million contract malaria and about 3 million die, most of which are children under 5 years old.

→ Human malaria is caused by infection with intracellular protozoan parasites of the genus Plasmodium that are transmitted by Anopheles mosquitoes.

Four species of Plasmodium infect humans: Plasmodium falciparum, P. vivax, P. ovale, P. malariae, with P. falciparum accounting for majority of infections and being the most lethal. The disease is transmitted most commonly by an infected female Anopheles mosquito.

→ Causes:

The causative agent of malaria was discovered in 1880 by Charles Alphonse Louis Laveran. Malaria mostly spreads to people through the bites of some infected female mosquito. Blood transfusion and contaminated needles may also transmit malaria.

→ Life cycle of Plasmodium falciparum:

Plasmodium falciparum is exclusively transmitted by female anopheles. The parasites have a complicated life cycle that requires a vertebrate host for the asexual cycle and a female mosquito (anopheles) for completion of the sexual cycle.

a) Human phase (Asexual reproduction):

Sporozoites → Merozoites → Male and female gametocytes

Infection of humans by *P. falciparum* is initiated by injection of sporozoites into the bloodstream by an anopheles. During a mosquito blood meal, infectious sporozoites in the mosquito's saliva enter the host bloodstream and invade its hepatocytes.

Sporozoites reach liver via bloodstream in 30 minutes. In the hepatocytes, asexual multiplication occurs, leading to the production of several thousand merozoites. In 1-2 weeks, a single sporozoite can give rise to 30,000 merozoites.

These merozoites are released into the bloodstream and invade erythrocytes. The asexual erythrocytic cycle begins when a single merozoite invades a host red blood cell. Finally, parasite undergoes 4-5 rounds of binary divisions, producing 8-36 new merozoites that burst from the host cell to invade new erythrocytes, beginning another round of infection. This phase of the infection is responsible for malaria pathogenesis. Some merozoites, after invasion of the erythrocytes, arrest their cell cycle and develop into male (micro) or female (macro) gametocyte.

b) Mosquito phase (Sexual reproduction):

Male + female gamete → Zygote → ookinetes → oocytes → Sporozoite

Inside the mid-gut of the mosquito, fertilization occurs,

producing zygotes, which develop into ookinetes. The ookinetes form oocysts, which then grow, divide and rupture to give rise to sporozoites, which migrate to the salivary glands. Then the infectious cycle of malaria can repeat itself.

→ Symptoms:

Intense fever, occurring in 24-72hr intervals, is accompanied by nausea, headaches, and muscular pain among other symptoms. Fatigue, vomiting, and in severe cases it can cause yellow skin, seizures, coma or death. Furthermore, a variety of potentially fatal symptoms, including liver failure, renal failure, and cerebral disease are associated with untreated P. falciparum.

→ Treatment:

Malaria is treated with antimalarial medication; the ones used depends on the type and severity of the disease. While medications against fever are commonly used. Recommended treatment for malaria is the intravenous use of antimalarial drugs. Normally Quinine is used to treat malaria but for severe malaria, artesunate is superior to quinine in both children and adult. Treatment of severe malaria involves a supportive measures that are best done in a critical care unit. This includes the management of high fevers and the seizures that may result from it. It also includes monitoring for poor breathing effort, low blood sugar, and low blood potassium.

→ Prevention:

Malaria can be prevented by avoiding mosquito

bites and by taking medicines. Lower the risk of getting malaria by avoiding mosquito bites.

→ Use mosquito nets when sleeping in places where malaria is present.

→ Use mosquito repellents after dusk.

→ Use coils and vaporizers.

→ Wear protective clothing (full sleeves)

→ Use window screens.

Typhoid

→ What is typhoid?

Typhoid fever is a bacterial infection that can spread throughout the body, affecting many organs. A life threatening infection caused by the bacterium salmonella typhi.

→ Causes:

Once Salmonella typhi bacteria are ingested, they multiply and spread into the bloodstream. It usually spread through contaminated food or water. Urbanization and climate change have the potential to increase the global burden of typhoid. In addition, increasing resistance to antibiotic treatment is making it easier for typhoid to spread in communities that lack access to safe drinking water or adequate sanitation.

→ Symptoms:

Salmonella typhi lives only in humans. Persons with typhoid fever carry the bacteria in their bloodstream and intestinal tract. Symptoms include;

- prolonged high fever
- Headache
- Nausea
- abdominal pain
- Constipation / diarrhea
- Some may have a rash.
- Severe cases may lead to serious complications or even death.

Treatment:

Typhoid fever can be treated with antibiotics. Antimicrobial resistance is common with likelihood of more complicated and expensive treatment options required in the most affected regions.

Even when the symptoms go away, people may still be carrying typhoid bacteria, meaning they can spread it to others, through shedding of bacteria in their ~~feces~~ faeces.

It is important for people being treated for typhoid fever to do the following:

- Take prescribed medicines (antibiotics) for as long as the doctor has prescribed.
- Wash hand with soap and water after using the bathroom and avoid preparing or serving food for other people. This will lower the chance of

- passing the infection on to someone else.
- Have their doctor test to ensure that no Salmonella typhi bacteria remain in their body.

Prevention:

- Get vaccinated against typhoid fever.
- Practice safe eating and drinking habits
- Buy bottled water or bring local water to a rolling boil for 1 minute before you drink it. Bottled carbonated water is safer than uncarbonated water.
- Eat properly cooked food
- Wash your hands with soap and water before eating
- Avoid foods and beverages from street vendors unless steaming hot.