MODULE 31 - MALARIA

OBJECTIVES

At the end of the session, the student will be able to:

1. Know more about malaria
2. Understand how malaria is spread
3. Understand how malaria can be prevented
4. Take steps towards the control and eradication of malaria

SUMMARY

Malaria is a serious and sometimes fatal disease caused by a parasite that commonly infects a certain type of mosquito, which feeds on humans. It can be seen in almost all parts of the developing world, especially in Africa and South Asia. This module discusses how malaria is caused and how it spreads. It also focuses on control and prevention methods that can be adopted by each individual to help in the gradual eradication of the disease.

TRANSCRIPTION

INTRODUCTION

Malaria is a common fever which can also be fatal. It is generally believed that malaria is caused by mosquitoes. However, mosquitoes don't cause malaria, but only spread the disease. It is caused by a parasite called Plasmodium that lives in mosquitoes. There are four species of plasmodium:

- Plasmodium falciparum
- Plasmodium vivax
- Plasmodium malariae
- Plasmodium ovale.

Plasmodium falciparum and plasmodium vivax are most commonly seen in India. They are also responsible for the malarial fever that rises every alternate day.

SYMPTOMS

In malaria, fever begins about 14 days after being bitten by a female anopheles mosquito. The mosquito requires human blood to fertilize her eggs. The 14-day period is

called the ‘incubation period’. The patient starts shivering and feels cold. Fingers and lips may turn blue and the skin may dry up. About 15 minutes to an hour later the patient feels very hot and the fever rises to a very high degree.

The patient feels very thirsty. He may also experience severe headache and vomiting. About 2-6 hours later the fever comes down with intense perspiration. The patient feels sleepy and on waking up feels weak.

These are common symptoms of malaria. Sometimes there may be come complications. The patient may have fits. He may start speaking incoherently. He may also become very aggressive. These are symptoms of cerebral malaria. Cerebral malaria is usually caused by Plasmodium falciparum.

At times, along with fever, the patient complains of black urine. This is called ‘black water fever’ and is also caused by Plasmodium falciparum.

A patient may also complain of weakness, giddiness, swelling in the lungs, blood in the urine, jaundice, etc.

Malaria can cause anemia in pregnant women and can also lead to miscarriage of the fetus.

SPREAD OF THE DISEASE:

Malaria begins when an infected mosquito bites a human being. The malarial parasite gets injected into the human being along with mosquito saliva, when the mosquito bites the human being.

The parasite first enters the liver. After passing through various stages of development, the parasite enters the red blood corpuscles or RBC in the blood. Here, it multiplies vary fast and the RBC bursts. This causes fever to rise in the human being. The entire process takes about 14 days.

When the RBC bursts some parasites enter new RBCs and the process beings again. This is when fever rises again.

Some parasites remain in the liver and can become active at any time. That’s why complete treatment is needed even after the fever has subsided, so that it does not rise again, or we can say ‘to ensure there is no relapse’.

When the RBC bursts come parasite get modified into male and female gametocytes. These male and female gametocytes enter the mosquito through the blood it sucks from

the human being and the mosquito now gets infected. In this way, the malarial parasite completes its lifecycle in the bodies of two hosts – the mosquito and the human being.

DIAGNOSIS & TREATMENT:

Any fever can be malaria. Therefore, it is very important to get a blood test done on the advice of a doctor, a volunteer in the village, etc. A blood test helps in identifying the species of the parasite present in the system.

When a blood-slide is prepared a patient with fever in a normal area is given one day's primary treatment while another in a high-risk area is given a three-day' primary treatment of chloroquin tablets. Primaquine may also be prescribed for the first day. Once the disease is confirmed through a blood test the complete treatment needs to be taken. Generally speaking, the complete treatment for vivax malaria is of five days, while that for falciparum malaria is of one day, even though the fever may have come down.

If it is confirmed that the malaria has been caused by plasmodium vivax a radical treatment of 14 days is essential, so that the fever does not return. In India, usually a five-day course of primary treatment is prescribed under the National Anti-malaria Program. Every individual residing in an area that might have malaria should undergo this treatment.

MALARIA ERADICATION

Malaria Eradication does not mean the elimination of mosquitoes but the elimination of the malaria parasite from the human population so that no further occurrence of malaria is possible.

In India the Malaria Control Program was first launched by the government in 1909. It underwent changes over the years and in 1958 came to be called the National Malaria Eradication Program, under the Ministry of Health & Family Welfare. In 1977 the Modified Plan of Action was evolved. 1995 saw the launch of the Malaria Action Program while in 1999 the program was renamed as the National Anti-malaria Eradication Program.

Under the National Anti-malaria Eradication Program trained personnel visit door to door to identify probable patients. They conduct blood tests and give medicines. The blood tests and medicines are available free of cost with employees of the anti-malaria department, government hospitals, primary health centers, medicine distribution centers, fever treatment centers, panchayats, post offices, village health workers, teachers, etc.

Anti-malaria workers conduct blood tests and identify the kind of parasite as well. They also spray insecticides at places where mosquitoes reside like inside houses, drains,

stagnant water bodies, etc, so that the mosquitoes present there are destroyed and the malaria infection cycle is disrupted.

STEPS FOR MALARIA CONTROL

The public can itself adopt some simple strategies for the control of malaria.

- Potholes, ditches, etc. where water can collect, can be filled in to reduce the number of mosquito breeding sites. This can be achieved through de-weeding, de-silting, filling, digging & channelization.

- Special types of fish which eat malaria larvae, like Guppy and Gambusia, can be introduced into small ponds and tanks that cannot be filled up.

- Overhead tanks, water coolers and ornamental fountains should be cleaned every week to prevent breeding of mosquitoes.

- Kerosene should be sprayed on any area where water is collected.

- Try to ensure that water does not collect in old tin cans, useless utensils, tyres, etc.

- Mosquito larvae can be destroyed by spraying medicines like Tamiphos and Phanthian.

- Polysterene floating on the surface of water prevents mosquitoes from laying eggs.

- Use mosquito nets while sleeping.

- Use wire nets on doors and windows and keep them closed in the evening to prevent the entry of mosquitoes.

- Smoke of neem leaves or neem oil keeps mosquitoes away.

- Use mosquito coils, mats and ointments.

Malaria can be totally eradicated from the roots. It is a local disease and needs the participation of the local people for eradication. If the citizens are aware and act responsibly, malaria can be eradicated.

GLOSSARY

1. Malaria: An infectious disease of tropical areas caused by the parasitic infection of red blood cells by a protozoan of the genus *Plasmodium,* which is transmitted by the bite of an infected female mosquito. Malaria is characterized by recurrent episodes of chills, fever, sweating, and anemia and is endemic in Africa, Central America, and much of Southern Asia and northern South America.

2. Plasmodium: A genus of protozoans that are parasites of the red blood cells of vertebrates and include the causative agents of malaria.

3. Cerebral Malaria: A strain of malaria caused by Plasmodium falciparum, which affects the brain and can be fatal.

4. Black Water Fever: A kind of malaria caused by Plasmodium falciparum where the patient complains of black urine, along with fever.

5. Anemia: Lack of adequate blood in the system.

6. RBC: Red Blood Corpuscles

7. Chloroquin: Medicine used for treating malaria

8. Malaria Eradication: Elimination of the malaria parasite from the human population so that no further occurrence of malaria is possible.

FAQs

Q1. What is Malaria?

Ans: Malaria is a serious and sometimes fatal disease caused by a parasite that commonly infects a certain type of mosquito which feeds on humans. People who get malaria are typically very sick with high fevers, shaking chills, and flu-like illness. Four kinds of malaria parasites can infect humans: *Plasmodium falciparum, P. vivax, P. ovale*, and *P. malariae. Infection* with *P. falciparum*, if not promptly treated, may lead to death. Although malaria can be a deadly disease, illness and death from malaria can usually be prevented.

Sub-Saharan Africa and South Asia are considered as high malaria-risk areas. The World Health Organization estimates that each year 300-500 million cases of malaria occur and more than 1 million people die of malaria, especially in developing countries. Most deaths occur in young children. For example, in Africa, a child dies from malaria every 30 seconds. Because malaria causes so much illness and death, the disease is a

great drain on many national economies. Since many countries with malaria are already among the poorer nations, the disease maintains a vicious cycle of disease and poverty.

Q2. How is malaria transmitted?

Ans: Usually, people get malaria by being bitten by an infective female *Anopheles* mosquito. Only *Anopheles* mosquitoes can transmit malaria and they must have been infected through a previous blood meal taken on an infected person. When a mosquito bites an infected person, a small amount of blood is taken in which contains microscopic malaria parasites. About 1 week later, when the mosquito takes its next blood meal, these parasites mix with the mosquito's saliva and are injected into the person being bitten.

Because the malaria parasite is found in red blood cells of an infected person, malaria can also be transmitted through blood transfusion, organ transplant, or the shared use of needles or syringes contaminated with blood. Malaria may also be transmitted from a mother to her unborn infant before or during delivery ("congenital" malaria).

Q3. Is malaria a contagious disease?

Ans: No. Malaria is not spread from person to person like a cold or the flu, and it cannot be sexually transmitted. You cannot get malaria from casual contact with malaria-infected people, such as sitting next to someone who has malaria.

Q4. Who is at risk for malaria?

Ans: Anyone can get malaria. Most cases occur in people who live in countries with malaria transmission. People from countries with no malaria can become infected when they travel to countries with malaria or through a blood transfusion (although this is very rare). Also, an infected mother can transmit malaria to her infant before or during delivery.

Q5. What are the signs and symptoms of malaria?

Ans: Symptoms of malaria include fever and flu-like illness, including shaking chills, headache, muscle aches, and tiredness. Nausea, vomiting, and diarrhea may also occur. Malaria may cause anemia and jaundice (yellow coloring of the skin and eyes) because of the loss of red blood cells. Infection with one type of malaria, *Plasmodium falciparum*,

if not promptly treated, may cause kidney failure, seizures, mental confusion, coma, and death.

Q6. How soon will a person feel sick after being bitten by an infected mosquito?

Ans: For most people, symptoms begin 10 days to 4 weeks after infection, although a person may feel ill as early as 7 days or as late as 1 year later. Two kinds of malaria, *P. vivax* and *P. ovale*, can occur again (relapsing malaria). In *P. vivax* and *P. ovale* infections, some parasites can remain dormant in the liver for several months up to about 4 years after a person is bitten by an infected mosquito. When these parasites come out of hibernation and begin invading red blood cells ("relapse"), the person will become sick.

Q7. How do I know if I have malaria for sure?

Ans: Most people, at the beginning of the disease, have fever, sweats, chills, headaches, malaise, muscles aches, nausea and vomiting. Malaria can very rapidly become a severe and life-threatening disease. The surest way for you and your health-care provider to know whether you have malaria is to have a diagnostic test where a drop of your blood is examined under the microscope for the presence of malaria parasites. If you are sick and there is any suspicion of malaria (for example, if you have recently traveled in a malaria-risk area) the test should be performed without delay.

Q8. How can malaria be prevented in a high risk area?

Ans: Malaria can be prevented by:

a) Preventing mosquitoes from biting people:
- Sleep under mosquito nets (ordinary or insecticide-treated)
- Screen all windows and doors in the house or, at least, in rooms where people sleep;
- Apply mosquito repellents to the skin
- Use mosquito coils
- Wear long-sleeved clothing, if out of doors at night

b) Controlling mosquito breeding:
- Eliminate places where mosquitoes can lay eggs
- Reclaim land by filling and draining
- Introduce special fish like Guppy & Gambusia that eat mosquito larvae
- Put special insecticides in the water to kill mosquito larvae

c) Killing adult mosquitoes
- Spray rooms with insecticides before going to bed; and
- Participate in activities carried out by the health services, such as spraying the inside walls of houses with insecticides that kill mosquitoes

Q9. Where do mosquitoes breed?

Ans: Malaria mosquitoes may breed in:

- Fresh or brackish water (slightly salty) water, especially if it is stagnant or slow-flowing
- Open streams with very slow-flowing water along their banks
- Pools of water left after the rains or as a result of poor water management
- Swamps, rice fields, and reservoirs
- Small ponds, pools, borrow-pits, canals, and ditches with stagnant water, in and around villages
- Animal hoof-prints filled with water
- Cisterns (water tanks) for storage of water
- Anything that may collect water – plant pots, old car tyres, etc
- Mosquitoes usually “operate” within a 2-kilometre radius.

Q10. When should malaria be treated?

Ans: The disease should be treated early in its course, before it becomes serious and life-threatening. Several good anti-malarial drugs are available, and should be taken early on. The most important step is to think about malaria if you are presently in, or have recently been in, an area with malaria, so that the disease is diagnosed and treated in time.

Q11. What is the treatment for malaria?

Ans: Malaria can be cured with prescription drugs. The type of drugs and length of treatment depend on the type of malaria, where the person was infected, their age, whether they are pregnant, and how sick they are at the start of treatment.

Q12. If someone gets malaria, will he/she have it for the rest of his/her life?

Ans: Not necessarily. Malaria can be treated. If the right drugs are used, people who have malaria can be cured and all the malaria parasites can be cleared from their body. However, the disease can continue if it is not treated or if it is treated with the wrong

drug. Some drugs are not effective because the parasite is resistant to them. Some people with malaria may be treated with the right drug, but at the wrong dose or for too short a period of time.

Two types (species) of parasites, *Plasmodium vivax* and *P. ovale*, have liver stages and can remain in the body for years without causing sickness. If not treated, these liver stages may re-activate and cause malaria attacks ("relapses") after months or years without symptoms. People diagnosed with *P. vivax* or *P. ovale* are often given a second drug to help prevent these relapses. Another type of malaria, *P. malariae*, if not treated, has been known to stay in the blood of some people for several decades.

However, in general, if you are correctly treated for malaria, the parasites are eliminated and you are no longer infected with malaria.

Q13. Where does malaria occur?

Ans: Malaria typically is found in warmer regions of the world -- in tropical and subtropical countries. Higher temperatures allow the *Anopheles* mosquito to thrive. Malaria parasites, which grow and develop inside the mosquito, need warmth to complete their growth before they are mature enough to be transmitted to humans.

Malaria occurs in over 100 countries and territories. More than 40% of the world's population is at risk. Large areas of Central and South America, Hispaniola (the Caribbean island that is divided between Haiti and the Dominican Republic), Africa, South Asia, Southeast Asia, the Middle East, and Oceania are considered malaria-risk areas.

Yet malaria does not occur in all warm climates. For example, malaria has been eliminated in some countries with warm climates, while a few other countries have no malaria because *Anopheles* mosquitoes are not found there.
