Puducherry ENVIS Hub

Host Centre : Puducherry Pollution Control Committee
Funded by Ministry of Environment, Forest & Climate Change
Government of India, New Delhi

ENVIS Puducherry
envispuducherry
envishubpdy
envishubpdy

WORLD MOSQUITO DAY

20th August, 2021

For more information visit us at **https://dste.py.gov.in/Envispdy/**

History

World mosquito day is celebrated annually on August 20. It is a commemoration of a British doctor, Sir Ronald Ross's discovery in 1897 that 'female mosquitoes transmit malaria between humans'. The London School of Hygiene and Tropical Medicine organizes world mosquito day celebrations every year, since the 1930s.

Mosquitoes are one of the deadliest animals in the world. Their ability to carry and spread diseases to humans causes millions of deaths every year. There are several different mosquitoes that can carry many different diseases. Aedes, Anopheles, Culex mosquitoes act as vectors (living organisms that can transmit infectious diseases between humans or from animals to humans) for the following diseases.

Aedes: Chikungunya, Dengue fever, Lymphatic filariasis, Rift Valley fever, Yellow fever, Zika

Anopheles: Malaria, Lymphatic filariasis (in Africa)

Culex: Japanese encephalitis, Lymphatic filariasis, West Nile fever

Introduction

What are vectors?

Vectors are living organisms that can transmit infectious diseases between humans or from animals to humans.

Many of these vectors are bloodsucking insects that ingest disease-producing microorganisms during a blood meal from an infected host (human or animal) and later inject them into a new host during their next blood meal. Mosquitoes are the best known disease vector.

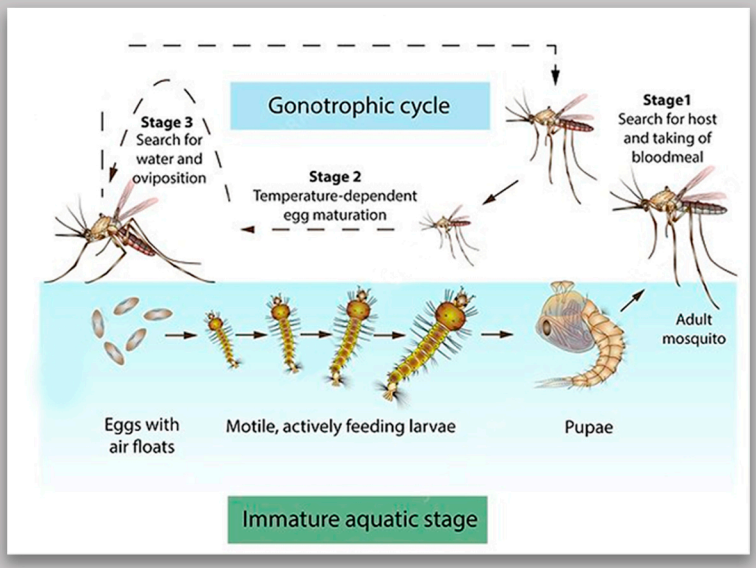
Anopheles stephensi Mosquito

Anopheles stephensi is in charge of the transmission of malaria fever in urban district of India. Among 53 Anopheline species present in India, 9 are vectors of malaria fever, viz., ***An. stephensi, An. sundaicus, An. varuna, An. culicifacies, An. fluviatilis, An. annularis, An. philippinesis, An. minimus*** and ***An. dirus*** and malaria is still the most critical reason for horribleness and mortality with around a few million new cases emerging each year.

Anopheles egg

Anopheles larva 8mm long

Life Cycle of Anopheles



Malaria

Malaria is a life-threatening mosquito-borne blood disease. The ***Anopheles stephensi*** mosquito transmits it to humans. The parasites in mosquitos that spread malaria belong to the ***Plasmodium*** genus. Over **100** types of ***Plasmodium*** parasite can infect a variety of species. Different types replicate at different rates, changing how quickly the symptoms escalate, and the severity of the disease. **Four** types of ***Plasmodium*** parasite can infect humans. These occur in different parts of the world. Some cause a more severe type of malaria than others.

Once an infected mosquito bites a human, the parasites multiply in the host's liver before infecting and destroying red blood cells.

Zika virus

Zika virus is a mosquito-borne flavivirus that was first identified in Uganda in 1947 in monkeys. It was later identified in humans in 1952 in Uganda and the United Republic of Tanzania.

Key Facts

1. Zika virus disease is caused by a virus transmitted primarily by **Aedes mosquitoes**, which bite during the day.

2. Symptoms are generally mild and include fever, rash, conjunctivitis, muscle and joint pain, malaise or headache. Symptoms typically last for 2–7 days. Most people with Zika virus infection do not develop symptoms.

3. Zika virus infection during pregnancy can cause infants to be born with microcephaly and other congenital malformations, known as congenital Zika syndrome. Infection with Zika virus is also associated with other complications of pregnancy including preterm birth and miscarriage.

4. An increased risk of neurologic complications is associated with Zika virus infection in adults and children, including Guillain-Barré syndrome, neuropathy and myelitis.

Signs and symptoms of the Zika virus most commonly include:

1. Mild fever 2. Rash 3. Joint pain, particularly in the hands or feet

4. Red eyes (conjunctivitis)

Other signs and symptoms may include:

1. Muscle pain 2. Headache 3. Eye pain 4. Fatigue or a general feeling of discomfort

5. Abdominal pain

Facts about mosquito borne diseases:

- Female Anopheles culicifacies is the main vector of malaria and commonly feeds on cattle as well as humans.
- Anopheles (Vector of malaria) breeds in rainwater pools and puddles, borrow pits, river bed pools, irrigation channels, seepages, rice fields, wells, pond margins, sluggish streams with sandy margins.
- Anopheles mosquito mostly bites between dusk and dawn.
- Female ***Aedes aegypti*** transmits dengue, chikungunya, zika and yellow fever diseases to humans.
- ***A. aegypti*** bites most frequently during daytime, and peak biting periods are early in the morning and in the evening before dusk.
- ***Aedes aegypti*** mosquito breeds in any type of manmade containers or storage containers having even a small quantity of water.
- Eggs of ***Aedes aegypti*** can live without water for more than one year.
- ***A. aegypti*** usually fly an average of 400 metres, but it can be transported accidently by humans from one place to another.
- Only female mosquitoes require a blood meal and bite animals while male mosquitoes do not bite but feed on the nectar of flowers or other suitable sugar source.

Causes of malaria

Malaria can occur if a mosquito infected with the ***Plasmodium*** parasite bites you. There are four kinds of malaria parasites that can infect humans: ***Plasmodium vivax, P. ovale***, **P. *malariae***, and ***P. falciparum***.

P. falciparum causes a more severe form of the disease and those who contract this form of malaria have a higher risk of death. An infected mother can also pass the disease to her baby at birth. This is known as congenital malaria.

Malaria is transmitted by blood, so it can also be transmitted through:

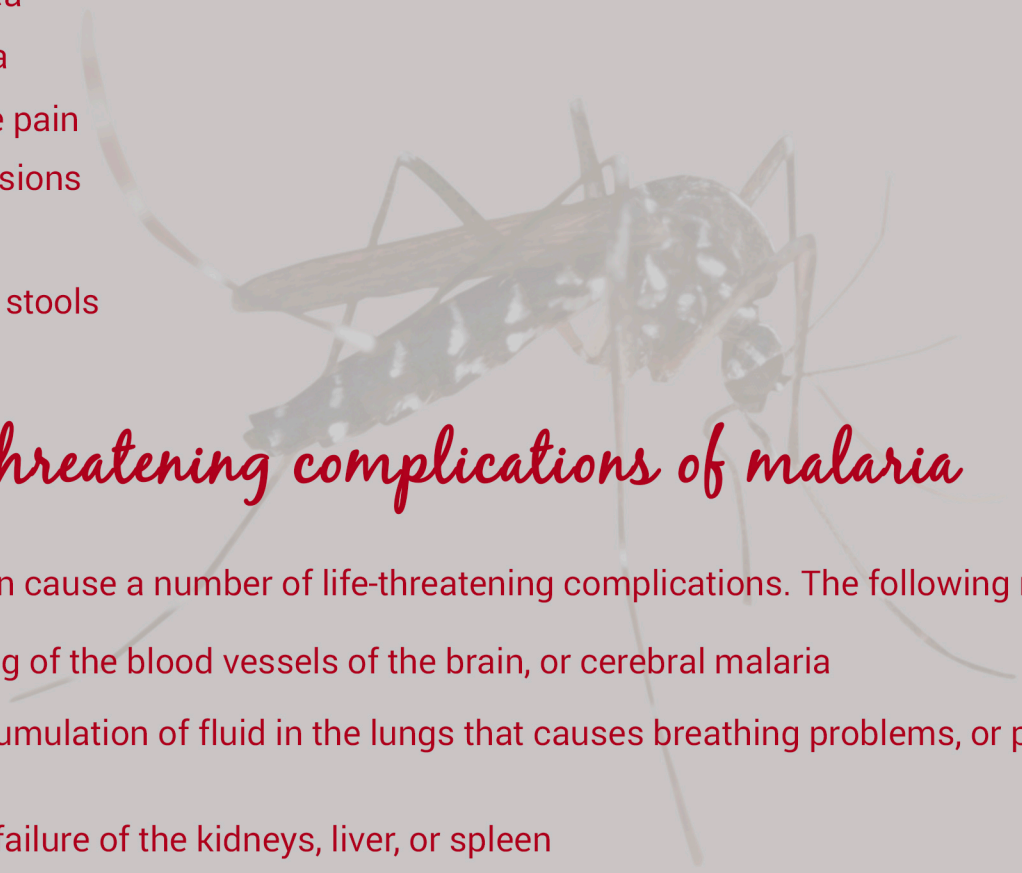
- **an organ transplant**
- **a transfusion**
- **use of shared needles or syringes**

Symptoms of Malaria?

The symptoms of malaria typically develop within 10 days to 4 weeks following the infection. In some cases, symptoms may not develop for several months. Some malarial parasites can enter the body but will be dormant for long periods of time.

Common symptoms of malaria include:

- Shaking chills that can range from moderate to severe
- High fever
- Profuse sweating
- Headache
- Nausea
- Vomiting
- Abdominal pain
- Diarrhea
- Anemia
- Muscle pain
- Convulsions
- Coma
- Bloody stools



Life-threatening complications of malaria

Malaria can cause a number of life-threatening complications. The following may occur:

- Swelling of the blood vessels of the brain, or cerebral malaria
- an accumulation of fluid in the lungs that causes breathing problems, or pulmonary edema
- Organ failure of the kidneys, liver, or spleen
- Anemia due to the destruction of red blood cells
- Low blood sugar

Prevention of Mosquito Bites

Mosquitos breed in water, so try to avoid having standing water near your home. Empty anything that holds stagnant water. Change the water in your birdbaths once a week, and empty children's wading pools when they're not in use.

It's also important to keep the grass and vegetation near your home well trimmed. Install screens in your windows to keep mosquitos out. And when you're outside in wooded or grassy areas, wear long sleeves and pants and use insect repellent.

Prevent mosquito borne diseases by 'Integrated vector management (IVM)'

IVM includes:

(a) Vector surveillance- Larval surveys and adult surveys are important for early detection of mosquito population so that proper control measures can be initiated at an early stage.

(b) Vector management- **It includes methods to eliminate mosquito breeding and adult mosquito population. These are**

(i) Environment management:

It includes efforts to reduce actual or potential larval (immature stages of mosquitoes) habitats in and around houses by:

- Covering all water containers in the house to prevent fresh egg laying by the vector.
- Emptying and drying water tanks, containers, coolers, bird baths, pets' water bowls, plant pots, drip trays at least once each week.
- Removing discarded items that collect rainwater from open spaces.
- Regularly checking for clogged gutters and flat roofs that may have poor drainage.

(ii) Biological control

- Introducing larvivorous fishes (Gambusia/ Guppy) in ornamental water tanks/garden.
- Using bacteria, Bacillus thuringiensis (Bt H-14) as biological larvicide in stagnant water. It poses no danger to humans, non-targeted animal species, or the environment when used according to directions.

(iii) Chemical control

- **Chemical larvicides** (such as temephos) are used in permanent big water containers where water has to be conserved or stored because of scarcity of water or irregular and unreliable water supply.

- **Adulticide-** In areas where cases of dengue, chikungunya, and/or Zika virus infection are detected pyrethrum spray or malathion fogging or ultra-low volume (ULV) spray are recommended for the control of adult mosquitoes. Indoor residual spraying with insecticides is used to control malaria.

(c) Personal protective/preventive measures

- using insect repellent;
- wearing clothes (preferably light-coloured) that cover as much of the body as possible;
- using physical barriers such as screening the windows and doors.
- sleeping under mosquito nets even during day time.
- patients infected with dengue, chikungunya, or zika virus, their household members, and community must follow personal preventive measures.

The National Vector Borne Disease Control Programme (NVBDCP)* It is one of the technical departments of the Directorate General of Health Services under the Ministry of Health and Family Welfare, Government of India and is the nodal agency responsible for the prevention and control of all vector-borne diseases in India.

***National Vector Borne Disease Control Programme-** http://nvbdcp.gov.in/index.php

Related link- https://www.nhp.gov.in/small-bite-big-threats_pg

ICMR INSTITUTES WORKING ON MALARIA

1. National Institute of Malaria Research, New Delhi (lead institute)
2. Regional Medical Research Centre (RMRC), Dibrugarh
3. Regional Medical Research Centre (RMRC), Bhubaneswar
4. Regional Medical Research Centre for Tribals, Jabalpur
5. Desert Medicine Research Centre (DMRC), Jodhpur
6. Vector Control Research Centre (VCRC), Puducherry
7. Regional Medical Research Centre, Port Blair
8. Division of Epidemiology and Communicable Diseases, ICMR Hqrs.

Vector Borne Diseases

Vector	Disease caused	Type of pathogen	Mode of Transmission	Risk Factor
Aedes 	**Chikungunya**	*Chikungunya virus (CHIKV)*	Chikungunya virus is transmitted to people through mosquito bites. Mosquitoes become infected when they feed on a person already infected with the virus.	A CHIKV infection causes fever and severe joint pain. Other symptoms include muscle pain, joint swelling, headache, nausea, fatigue and rash.
	Dengue	*(DENV-1, DENV-2, DENV-3 and DENV-4)*	Mosquitoes become infected when they bite a person infected with the virus. Infected mosquitoes can then spread the virus to other people through bites.	Dengue is a severe, flu-like illness that affects infants, young children and adults, but seldom causes death.
	Lymphatic filariasis	*Wuchereria bancrofti*	Infection occurs when filarial parasites are transmitted to humans through mosquitoes.	damage to the lymphatic system.
	Rift Valley fever	Rift Valley fever (RVF)	People usually get Rift Valley fever through contact with blood, body fluids, or tissues of infected animals, mainly livestock such as cattle, sheep, goats, buffalo, and camels. People can also get RVF through bites from infected mosquitoes	This usually appears as 1 or more of 3 distinct syndromes: ocular (eye) disease (0.5–2% of patients), meningoencephalitis (less than 1% of patients) or haemorrhagic fever (less than 1% of patients).
	Yellow Fever	Yellow fever virus (arbovirus)	Yellow fever virus is transmitted to people primarily through the bite of infected Aedes mosquitoes. Mosquitoes acquire the virus by feeding on infected primates (human or non-human) and then can transmit the virus to other primates (human or non-human).	Yellow fever results in death for 20% to 50% of those who develop severe disease. Complications during the toxic phase of a yellow fever infection include kidney and liver failure, jaundice, delirium, and coma.
	Zika	Zika Virus	Zika virus is primarily transmitted by the bite of an infected mosquito from the mainly Aedes aegypti. Usually bite during the day, peaking during early morning and late afternoon/evening	Zika infection during pregnancy can cause a birth defect of the brain called microcephaly and other severe brain defects.
Anopheles 	**Lymphatic filariasis**	*Wuchereria bancrofti*	Infection occurs when filarial parasites are transmitted to humans through mosquitoes.	damage to the lymphatic system.
	Malaria	*Plasmodium falciparum and Plasmodium vivax*	The parasite is spread to humans through the bites of infected mosquitoes	Cerebral malaria: If parasite-filled blood cells block small blood vessels to your brain (cerebral malaria), swelling of your brain or brain damage may occur. Cerebral malaria may cause seizures and coma. Organ failure: Malaria can damage the kidneys or liver or cause the spleen to rupture. Any of these conditions can be life-threatening.
Culex 	**Japanese encephalitis**	Japanese encephalitis virus JEV	The virus is maintained in a cycle between mosquitoes and vertebrate hosts, primarily pigs and wading birds. Humans are incidental or dead-end hosts	infected people develop inflammation of the brain (encephalitis)
	Lymphatic filariasis	*Wuchereria bancrofti*	Infection occurs when filarial parasites are transmitted to humans through mosquitoes.	damage to the lymphatic system.
	West Nile fever	West Nile Virus (WNV)	Mosquitoes transmit this virus by biting an infected bird and then biting a person.	West Nile virus can cause a fatal neurological disease in humans.