UNIT 2  COMMUNICABLE DISEASES
1 – VECTOR BORNE DISEASES

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2.0 INTRODUCCION
In the previous unit, you have read about epidemiology of communicable diseases, causative organisms for various communicable diseases. In this unit we will discuss symptoms, diagnosis, management and referral for vector borne diseases in details, and measures for mosquito control.

2.1 OBJECTIVES
After reading this unit, you will be able to identify the:

- symptoms, diagnosis, management and referral for Malaria;
- symptoms, diagnosis, management and referral for Filaria;
- symptoms, diagnosis, management and referral for Kala-azar;
- symptoms, diagnosis, management and referral for Japanese Encephalitis;
2.2 MOSQUITO BORNE DISEASES

As far as human health is concerned, mosquitoes are the most important among all the insects. Diseases occur due to three major types of mosquitoes in India are:

1) Anopheles
2) Culex, and
3) Aedes.

The diseases caused by these mosquitoes are as follows:

2.3 MOSQUITO CONTROL MEASURES

An integrated approach of mosquito control is followed, which is highlighted in Fig. 2.1 below:

- **Anti-Larval Measures**
  - Environmental control
  - Chemical Control
  - Biological Control

- **Anti-Adult Measures**
  - Residual Sprays
  - Space Sprays
  - Genetic Control

- **Personal Protection**
  - Mosquito net
  - Screening
  - Repellents

**Fig. 2.1: Mosquito Control Measures**

- **Anti-Larval Measures** - Environmental control measures are directed at reducing the mosquito breeding places by environmental manipulation and modification. Chemical control is done by the use of larvicides like Kerosene, Paris Green and synthetic insecticides. Biological control can be done by using a larvae eating fish known as Gambusia.

- **Anti-Adult Measures** - Insecticidal residual spray of DDT, Malathion and space spray (fogging) of pyrethrum extract.

- **Personal Protection** - Most of the mosquitoes except Aedes generally bite at night. Therefore, mosquito nets can offer protection during sleep. The mosquitoes should be light coloured with the diameter of each hole less than 0.0475 inch. Screening of doors and windows with nets also prohibit the entry of mosquitoes inside the house.
Check Your Progress 1

<table>
<thead>
<tr>
<th>i) Which of the following mosquito-borne disease is caused by virus?</th>
</tr>
</thead>
</table>
| A. Dengue  
| B. Malaria  
| C. Filaria  
| D. None of the above |

<table>
<thead>
<tr>
<th>ii) Fogging is a method to kill the mosquito at which stage of its life cycle?</th>
</tr>
</thead>
</table>
| A. Larva  
| B. Pupa  
| C. Adult  
| D. Egg |

2.4 MALARIA

Malaria is a common disease in India. It is caused by Plasmodium and transmitted to man by infected female Anopheles mosquito. Malaria is commonly caused by Plasmodium vivax and Falciparum in India. Plasmodium falciparum has a higher mortality than Plasmodium vivax.

2.4.1 Clinical Symptoms and Diagnosis

Malaria is characterised by paroxysmal attacks of fever, every 3rd or 4th day. The fever attacks have three distinct stage:

1) Cold Stage: Headache, nausea, vomiting and chills with rigors. The temperature rises, and this stage lasts for an hour.

2) Hot Stage: The headache worsens and the body temperature is very hot. It lasts for 2–6 hours.

3) Sweating Stage: The temperature drops down to normal with profuse sweating.

Apart from the symptoms above, the patient may also have jaundice, anaemia and other complications that can occur in Malaria.

The diagnosis of malaria can be made by microscopy or rapid diagnostic tests. The microscopy to identify malarial parasites can be done by making ‘Thick’ and ‘Thin’ films, both on the single microscopic slide. The thick film is useful for diagnosis and the thin film for identification of the Malaria species.

Rapid diagnostic kits can also be used to make the diagnosis of malaria, but should be carefully used to avoid false negative results. Please refer Practical Unit 3 of Practical Course 3, Block 2 for preparation of peripheral smear for malaria using Rapid kit in details.

2.4.2 Primary Management and Referral

For any suspected case of Malaria– a blood test or rapid diagnostic testing should be done.

The medicine chosen will depend upon whether the patient has vivax or falciparum. The uncomplicated Malaria caused by Vivax can be treated with Chloroquine, 10 mg/kg, once a day for 3 days and Primaquine, 0.25 mg/kg, once a day for 14 days. Along with the antimalarials, fever should be treated with Paracetamol. Falciparum Malaria is treated with Artemesinin based combination therapy.

If the patient has altered level of consciousness, seizures, shortness of breath or severe malnutrition or any other signs of complicated Malaria, he/she should be referred to a Primary Health Centre.
**Check Your Progress 2**

1) Which is the most common cause of Malaria in India?
   A. Plasmodium ovale    B. Plasmodium vivax
   C. Plasmodium malariae  D. None of the above

2) Explain the stages of malarial fever.
   ................................................................................................................
   ................................................................................................................

2.5 FILARIA

‘Filar’ means thread-like. Lymphatic filariasis is infection with the filarial worms, Wuchereria bancrofti, Brugia malayi or B. timori, the former being the most widespread parasite. Therefore, the disease is also called ‘Wuchereriasis’ (Bancroftian filariasis). These parasites are transmitted to humans through the bite of an infected mosquito and develop into adult worms in the lymphatic vessels, causing severe damage and swelling (lymphoedema) shown in the Table 2.2 below:

<table>
<thead>
<tr>
<th>Parasites</th>
<th>Vectors (Mosquitoes)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wuchereria bancrofti</td>
<td>Culex</td>
</tr>
<tr>
<td>Brugia malayi</td>
<td>Mansonia</td>
</tr>
<tr>
<td>Brugia timori</td>
<td>Mansonia/Anopheline</td>
</tr>
</tbody>
</table>

The adult worms, which usually stay in one tissue, release early larval forms known as microfilariae into the host’s bloodstream. These circulating microfilariae can be taken up with a blood meal by the arthropod vector; in the vector, they develop into infective larvae that can be transmitted to a new host.

Repeated mosquito bites over several months to years are needed to get lymphatic filariasis. People living for a long time in tropical or sub-tropical areas where the disease is common are at the greatest risk for infection. Short-term tourists have a very low risk.

2.5.1 Clinical Symptoms and Diagnosis

Clinical Spectrum of lymphatic filariasis are as follows:

1) LYMPHATIC FILARIA

a) **Asymptomatic amicrofilaraemia** which has following characteristics given below:
   - Patients have had great exposure to the lymphatic filariasis vector, but still show no infection.
   - These patients may have immunity to the disease, and could be of great use to medical researchers.
   - They have an infection that is not detected by standard clinical tests, but may exhibit filarial antigens in their blood.

b) **Asymptomatic microfilaraemia**
   - show no overt symptoms of lymphatic filariasis, but have levels of microfilariae in their blood.
Communicable Diseases and Management Under National Health Programme

• Have an elevated risk of developing chronic symptoms such as lymphodema, hydrocoele or elephantiasis.

c) Acute Symptoms
• Most commonly exhibited as fever, lymphangitis and lymphadenitis.
• The fever, often called “filarial” or “elephantoid” fever, is immune-mediated and generally accompanies attacks of lymphangitis.
• Sites for lymphangitis are often limbs, but also very typically the scrotum.
• Clinical symptoms are tender and hot sensations along the lymphatic channel, and sometimes abscesses can develop.
• Lymphadenitis is the formation of firm nodules due to the collections of adult worms in the lymph vessels or nodes. In men, nodules tend to form around the scrotal area.

d) Chronic Symptoms
• Hydrocoele is the condition associated with severe and often permanent inflammation of the spermatic cord. It can occur due to the concentration of worms in lymph vessels around the scrotal area.
• If the hydrocoele is an extension of the lymph vessel, microfilariae are often found in hydrocoele fluid.
• If a hydrocoele or other swollen lymph breaks open into the urinary tract, patients exhibit the condition known as chyluria, patients who have chyluria have urine of milky appearance and consistency due to the high content of lymph in their urine. If not treated promptly and effectively, chyluria can result in loss of important nutrients.
• The most dramatic and debilitating result of lymphatic filariasis is elephantiasis.
• Elephantiasis is severe swelling in the limbs, scrotum, breasts and vulva due to blockage in the lymph vessels caused by nests of adult worms.

2) OCCULT FILARIASIS
• Classical manifestations are not present.
• Microfilariae are not found in the blood.
• Believed to result from a hypersensitivity reaction to filarial antigens derived from microfilariae. (Best known example is tropical pulmonary eosinophilia)

Diagnosis: Let us now read the diagnosis for microfilariae as given below:
Identification of microfilariae in a blood smear by microscopic examination:
• Standard method.
• The microfilariae that cause lymphatic filariasis circulate in the blood at night (called nocturnal periodicity).
• Blood collection should be done at night to coincide with the appearance of the microfilariae, and a thick smear should be made and stained with Giemsa or hematoxylin and eosin.
• For increased sensitivity, concentration techniques can be used.

Serologic techniques:
• Patients with active filarial infection typically have elevated levels of antifilarial IgG4 in the blood and these can be detected using routine assays.

Immunochromatographic card test (ICT):
• High sensitivity and specificity.
• Detects *W. bancrofti* infection.
• Test kits are commercially available.
• The test requires 100 microlitre of finger-prick blood drawn at any time, day or night.

![ICT test results](image)

NEGATIVE POSITIVE (Weak) POSITIVE

2.5.2 Primary Management and Referral

Lymphedema management
The guidelines for the first level care worker developed by WHO to manage acute dermato-lymphangioadenitis (ADLA) are as follows:

1) Treatment for Uncomplicated ADLA:
A) Give Analgesic such as paracetamol (1g given 3–4 times a day)
B) Give oral antibiotic such as amoxicillin (1.5 g in 3 divided doses or oral penicillin) for atleast 8 days. In case of allergy to penicillin, oral erythromycin (1g, given 3 times a day) can be used.
C) Clean the limb with antiseptic
D) Check for any wounds, cuts, abscesses and inter digital infection
E) Give advice about prevention of chronic lymphedema caused by lymphatic filariasis
F) Do not give anti-filarial medicine
G) Home management includes following measures:
   • drinking plenty of water
   • rest
   • limb elevation
   • wriggling of toes
   • cooling the limb with cold water.
H) Follow-up after 2 days at home. If situation does not improve, then refer the patient to physician.
2) Treatment of Severe ADLA:
   A) Refer the patient to physician immediately to receive recommended antibiotic treatment
      • Antibiotics: Inj. penicillin
   B) Give analgesic/antipyretic such as paracetamol
   C) Do not give anti-filarial medicine

**Hydrocele management**

   • Individuals with scrotal swelling should be referred to a facility for diagnosis, and if necessary surgery

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**Check Your Progress 3**

1) Which of the following mosquitoes cannot cause Filaria?
   A. Mansonia  B. Culex  C. Aedes  D. None of the above

2) List home management measures for filaria.

   ................................................................................................................
   ................................................................................................................

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### 2.6 KALA-AZAR (KA)

Kala-Azar is a parasitic disease caused by a protozoa named *Leishmania*, transmitted by the bite of infected female phlebotomine argentipes (sand fly).

The favourable transmission factors are:

- Rural areas where houses are frequently constructed with mud walls and earthen floors, and cattle and other livestock live close to humans
- Heavy annual rainfall
- Mean humidity above 70%
- Temperature range of 15–38°C
- Abundant vegetation, subsoil water and alluvial soil

Kala-azar is endemic in 54 districts in the country including districts of Bihar, Jharkhand and West Bengal besides sporadic cases in 6 districts of eastern Uttar Pradesh. The State of Bihar alone contributes to more than 70% of total KA reported from the four States.

#### 2.6.1 Clinical Symptoms and Diagnosis

- Fever
- Splenomegaly and hepatomegaly
- Anaemia
- Weight loss
- Darkening of skin of face, hands, feet and abdomen
- Lymphadenopathy (atypical feature)
Communicable Diseases
1 – Vector Borne Diseases

• Post kala-azar dermal leishmaniasis:
  • Several years after cure of disease
  • Multiple nodular infiltration of skin usually without ulceration
• Cutaneous leishmaniasis: painful ulcers in part of body exposed to sand fly.

Diagnosis:
• In blood examination- Progressive leucopenia and severe anaemia are striking features of Kala-Azar along with progressive decline in total leucocyte count (Leucopenia). Detection of the causative organism (Leishmania Donovani) is done through serological tests-like ELISA.
• Leishmanin/Montenegro test: Intra-dermal injection of 0.1 ml of leishmanin is injected on flexor aspect of forearm and induration measured after 48–72 hours.

2.6.2 Primary Management and Referral
The patients should be given Sodium stibogluconate at the dose of 20 mg/kg body weight (maximum 850 mg/day) by single injection, intramuscularly for 20–30 days depending on the response. The absence of parasitic load should be checked at the end of treatment through a splenic/bone marrow smear.

In case of resistance, the second line of management is Amphotericin B at 1 mg/kg on alternate day for 15–20 days.

Check Your Progress 4

1) Which of the following is a vector of Kala-Azar?
   A) Culex mosquito  B) Anopheles mosquito
   C) Aedes mosquito  D) Sandfly

2.7 JAPANESE ENCEPHALITIS (JE)
• Japanese encephalitis (JE) is the leading cause of viral encephalitis in Asia, with up to 70,000 cases reported annually.
• Case-fatality rates range from 0.3% to 60% and depend on the population and age.
• Residents of rural areas in endemic locations are at highest risk, JE does not usually occur in urban areas.
• JE viral activity has been widespread in India. The first evidence of presence of JE virus dates back to 1952.
• First case was reported in 1955.
• Outbreaks have been reported from different parts of the country.
• During recent past (1998–2004), 15 States and Union Territories have reported JE incidence.
• Annual incidence ranged between 1714 and 6594 and deaths between 367 and 1665.
• Mortality of this disease varies but is generally much higher in children.
• This disease is most prevalent in Southeast Asia and East Asia.
• It is transmitted by infective bites of female mosquitoes mainly belonging to Culex tritaeniorhynchus, Culex vishnui and Culex pseudovishnui group are the chief vectors of JE in different parts of India.
• Primarily affects central nervous system.
• JE transmission intensifies during rainy season.
• Domestic pigs and wild birds are reservoirs of the virus.
• Natural hosts of JE virus include water birds of Ardeidae family (mainly pond herons and cattle egrets).
• Pigs play an important role in the natural cycle and serve as an amplifier host since they allow manifold virus multiplication without suffering from disease and maintain prolonged viraemia.
• Due to prolonged viraemia, mosquitoes get opportunity to pick up infection from pigs easily.
• Man is an accidental and dead end host in transmission cycle due to low and short-lived viraemia.

2.7.1 Clinical Symptoms and Diagnosis
• Incubation period for Japanese encephalitis virus (JEV) is of 5 to 15 days.
• Majority of infections are asymptomatic. Only 1 in 250 infections develop into encephalitis.
• JE virus infection presents classical symptoms similar to any other viral encephalitis.
• JE virus infection may result in febrile illness of variable severity associated with neurological symptoms ranging from headache to meningitis or encephalitis.
• Severe rigors may mark the onset of this disease, headache, fever (38-41°C), meningeal signs, stupor, disorientation, coma, tremors, paralysis (generalised), hypertonia, loss of coordination etc.
• Prodromal stage may be abrupt (1–6 hours), acute (6–24 hours) or more commonly subacute (2–5 days).
• In acute encephalitic stage includes symptoms noted in prodromal phase, neck rigidity, convulsions, alteration of sensorium, behavioural changes, motor paralysis and involuntary movement supervene and focal neurological deficit is common. Usually lasts for a week but may prolong due to complications.
• Amongst patients who survive, some lead to full recovery through steady improvement and some suffer with stabilisation of neurological deficit such as deafness, emotional lability and hemiparesis may occur in those who have had central nervous system involvement. Mental retardation is usually developed.
• Convalescent phase is prolonged and vary from a few weeks to several months.
Diagnosis

A) Clinical:
Clinically JE cases present signs and symptoms similar to encephalitis of viral origin and cannot be distinguished for confirmation. However, JE can be suspected as the cause of encephalitis as a febrile illness of variable severity associated with neurological symptoms ranging from headache to meningitis or encephalitis. Symptoms can include headache, fever, meningeal signs, stupor, disorientation, coma, tremors, paralysis (generalised), hypertonia, loss of coordination etc.

B) Laboratory: Several laboratory tests are available for JE virus detection which include-
1) Antibody detection: Hemagglutination Inhibition Test (HI), Compliment Fixation Test (CF), Enzyme Linked Immuno-Sorbant Assay (ELISA) for IgG (paired) and IgM (MAC) antibodies, etc.
2) Antigen Detection: RPHA, IFA, Immunoperoxidase etc.
3) Genome Detection : RTPCR
4) Virus Isolation : Tissue culture, Infant mice, etc
Due to limitations associated with various tests, IgM ELISA is the method of choice provided samples are collected 3–5 days after the infection.

2.7.2 Primary Management and Referral
There is no specific anti-viral medicine or treatment available against JE virus. The cases are managed symptomatologically.

A) Fever-tap water vigorous sponging, paracetamol
B) Convulsion- anti convulsants
C) Secretion- suction
D) Nil orally
E) Position of patient- prone with head on one side, oxygen if possible.

Danger signs are:
Lethargy,
Unconsciousness,
Convulsion,
other findings like paralysis, rashes and hepatosplenomegaly etc.

If present- Referral is done to nearest first referral unit (FRU)

Treatment-
• i.v. line
• Correction of blood sugar
2.8 DENGUE

Dengue is a mosquito-borne viral infection transmitted by female mosquitoes mainly of the species Aedes aegypti and, to a lesser extent, Ae. albopictus. The same mosquito which transmits chikungunya, yellow fever and Zika infection.

There are 4 distinct, but closely related, serotypes of the virus that cause dengue (DEN-1, DEN-2, DEN-3 and DEN-4). However, cross-immunity to the other serotypes after recovery is only partial and temporary. Subsequent infections by other serotypes increase the risk of developing severe dengue.

- Infected symptomatic or asymptomatic humans are the main carriers and multipliers of the virus, serving as a source of the virus for uninfected mosquitoes.
- Patients who are already infected with the dengue virus can transmit the infection (for 4–5 days; maximum 12) via Aedes mosquitoes after their first symptoms appear.
- It is common in urban habitats due to improper water management facilities, water accumulation in non-degradable tyres, coolers, flower vases in the apartments etc.
- Overhead tanks, ground water storage tanks and septic tanks are usually the primary habitats. That is, Ae aegypti breeds almost entirely in man-made water receptacles found in and around households, construction sites, factories.
- Unlike other mosquitoes Aedes aegypti is a day-time feeder; its peak biting periods are early in the morning and in the evening before dusk (sunset).
### 2.8.1 Clinical Symptoms and Diagnosis

<table>
<thead>
<tr>
<th>Dengue Fever</th>
<th>Dengue Haemorrhagic Fever (DHF)</th>
<th>Dengue Shock Syndrome (DSS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flu-like symptoms and lasts for 2-7 days. Dengue fever usually occurs after an incubation period of 4-10 days after the bite of the infected mosquito. High Fever (40°C/104°F) is usually accompanied by at least two of the following symptoms: • Headaches • Pain behind eyes • Nausea, vomiting • Swollen glands • Joint, bone or muscle pains • Rash</td>
<td>Fever and Haemorrhagic manifestation (positive tourniquet test) Evidence of plasma leakage Spontaneous bleeding Circulatory failure (weak pulse, narrow pulse pressure (20 mmHg), hypotension, restlessness). Profound shock with undetectable BP and pulse</td>
<td>Dengue Shock Syndrome is of short duration (12-24 hrs), but can be fatal. Usually Systolic BP falls late, but pulse pressure (Systolic BP-Diastolic BP) deteriorates much earlier 20 mmHg If prolonged, Shock causes metabolic acidosis and multi organ failure Hypovolemic shock due to plasma leakage Pleural effusion, Ascites (plasma leakage to pleural &amp; peritoneal cavities) Hypothermia-Cold clammy skin Fulminant hepatic failure</td>
</tr>
</tbody>
</table>

**Laboratory findings:**
- Leucopenia (WBC ≤ 5000 cells/mm³).
- Thrombocytopenia (Platelet count <150 000 cells/mm³).
- Rising haematocrit (5%-10%).
- No evidence of plasma loss

**Laboratory findings:**
- Thrombocytopenia <100 000 cells/ mm³; Haematocrit rise 20%

**Laboratory findings:**
- Increased Packed Cell Volume - the earliest feature of Dengue Haemorrhagic Fever
- Decreased Platelet
- Decreased Total Leucocyte Count
- Decreased Serum Albumin
- Increased Liver Function Tests
- Serological Tests

### 2.8.2 Primary Management and Referral
- All dengue patients must be carefully observed for complications for at least 2 days after recovery from fever. This is because life threatening complications often occur during this phase. Patients and households should be informed
that severe abdominal pain, passage of black stools, bleeding into the skin or from the nose or gums, sweating, and cold skin are danger signs.

- If any of these signs is noticed, the patient should be taken to the hospital. The patient who does not have any evidence of complications and who has been afebrile for 2–3 days does not need further observation.

- Fluid Intake- Oral or Intra venous (IV).
- ORS and fruit juices should be preferred over water
- Antipyretics- Paracetamol.
- Avoid Aspirin (May cause Reye’s Syndrome) and other NSAIDS, e.g. Ibuprofen (these may cause gastric bleeding).
- Monitor for warning signs.
- Daily check packed cell volume from Day 3 of fever till Day 2 after fever.

**Referral**

- Patient should be referred for platelet transfusion; if platelets are below 10,000/cu.mm, but the patient should not be discharged unless the platelets are more than 50,000/cu.mm.
- Extremes of age, pregnancy, peptic ulcer disease, menstruation, haemolytic anaemia, G6PD deficiency, thalaessemic patient, patients on steroids, NSAIDs or chronic conditions like Diabetes, Hypertension, Asthma, Cirrhosis should be considered as high risk patients and should be referred as early as possible, of needed.

**Check Your Progress 6**

1) Which of the following is not found in Dengue?
   A) Decreasing WBC  B) Decreasing Platelets  C) Decreasing leucocytes  
   D) Decreasing Liver function tests

**2.9 CHIKUNGUNYA**

You have learned in previous section regarding various other vector borne diseases. Chikungunya is one of them which is transmitted by a bite of infected mosquitoes. It is a viral disease, which was first reported from Africa from where it has derived its name Chikungunya, meaning “that which bends up”. This is a reference to the Chikungunya symptom where patients walk in a bent posture due to joint pain.

Two types of Aedes species are implicated in causing this disease, Ae. aegypti and Ae. Albopictus. Ae. aegypti mosquito (which you must be familiar from yellow fever section) is the primary transmission agent of Chikungunya Virus in Indian subcontinent. Aedes aegypti bites during daytime and breed in stored water. Presence of stagnated water in and around human inhabitation is one of the main causes of increased Aedes mosquito population.

**2.9.1 Clinical Symptoms and Diagnosis**

Chikungunya typically starts with one or more of the following symptoms - chills, fever, vomiting, nausea, headache and joint pain. Symptoms usually begin 3–7 days after being bitten by an infected mosquito. The attack is sudden and sometimes it is accompanied with rashes. Severe joint pain is the main and the
most problematic symptom of Chikungunya. Other less commonly seen symptoms includes mouth ulcers, loss of taste and conjunctivitis. Initial symptoms are similar to dengue fever. It is usually NOT life threatening and most patients feel better within a week. But the joint pains can last for a long time and full recovery may take months. Chikungunya disease does not often result in death, but the symptoms can be severe and disabling. People at risk for more severe disease include newborns infected around the time of birth, older adults (≥65 years), and people with medical conditions such as high blood pressure, diabetes, or heart disease. Usually patient gets life long immunity from infection and hence re-infection is very rare.

**Diagnosis**

Diagnosis is based on serological test and virological methods done on patient suspected of having chikungunya. Serological test includes enzyme-linked immunosorbent assays (ELISA), which may confirm the presence of anti-chikungunya antibodies. ELISA test is very sensitive but antibody levels are not enough during the first week after the onset of symptoms to be detected. The virus may be isolated from the blood during the first few days of infection. Various reverse transcriptase–polymerase chain reaction (RT–PCR) methods are available but are of variable sensitivity, so only some are suited for diagnosis. So samples collected during the first week after the onset of symptoms should be tested by both serological and virological methods (RT–PCR).

**2.9.2 Primary Management and Referral**

There is no specific antiviral drug treatment for chikungunya. Treatment is directed primarily at relieving the symptoms, including the joint pain using anti-pyretics, optimal analgesics and fluids. There is no commercial chikungunya vaccine.

- Typical treatment includes
  - Get plenty of rest.
  - Drink fluids to prevent dehydration.
  - Take medicine such as paracetamol to reduce fever and pain.
  - Do not take aspirin and other non-steroidal anti-inflammatory drugs (NSAIDS until dengue can be ruled out to reduce the risk of bleeding).
- If the patient is a confirm case of chikungunya, then prevent mosquito bites for the first week of the illness.
  - During the first week of infection, chikungunya virus can be found in the blood and passed from an infected person to a mosquito through mosquito bites.
  - An infected mosquito can then spread the virus to other people.

Since chikungunya is cured by immune system in almost all cases there is no need to worry. Alternative medical systems such as ayurveda and homeopathy have specific treatments for Chikungunya. Many of these treatments are helpful in reducing the symptoms especially the joint pain.

**Preventive measures against chikungunya:**

The proximity of mosquito vector breeding sites to human habitation is a significant risk factor for chikungunya. Prevention and control relies heavily on reducing the number of natural and artificial water-filled container habitats that support breeding of the mosquitoes. During outbreaks, insecticides may
be sprayed to kill flying mosquitoes, applied to surfaces in and around containers where the mosquitoes land, and used to treat water in containers to kill the immature larvae.

For protection during outbreaks of chikungunya, clothing which minimises skin exposure to the day-biting vectors is advised. Repellents can be applied to exposed skin or to clothing in strict accordance with product label instructions. Repellents should contain DEET (N, N-diethyl-3-methylbenzamide), IR3535 (3-[N-acetyl-N-butyl]-aminopropionic acid ethyl ester) or icaridin (1-piperidinecarboxylic acid, 2-(2-hydroxyethyl)-1-methylpropylester). For those who sleep during the daytime, particularly young children, or sick or older people, insecticide-treated mosquito nets provides good protection. Mosquito coils or other insecticide vapourisers may also reduce indoor biting.

Basic precautions should be taken by people travelling to risk areas and these include use of repellents, wearing long sleeves and pants and ensuring rooms are fitted with screens to prevent mosquitoes from entering.

We are yet to find a vaccine for Chikungunya. The good news is that a number of Chikungunya vaccines are in experimental stage. Currently the only way to prevent Chikungunya disease to avoid mosquito bites! Chikungunya virus spreads from human to human only through mosquito carrier. Hence mosquito breeding control is the best way to fight Chikungunya.

### Check Your Progress 7

1) List the vectors causing Chikungunya.
   ........................................................................................................................................
   ........................................................................................................................................

2) True / False
   i) Eating infected poultry transmits Chikungunya. (T/F)
   ii) Severe joint pain is the most problematic symptom of Chikungunya. (T/F)
   iii) If not treated on time, Chikungunya may be life threatening. (T/F)
   iv) Chikungunya is self-limiting disease. (T/F)

3) Fill in the blanks:
   i) Vector of Chikungunya bites during………..
   ii) The symptoms of ………… resemble Chikungunya during initial days of infection.

4) …………… control is the best way to fight Chikungunya.

### 2.10 LET US SUM UP

In this unit we have discussed in details regarding various vector borne diseases, their symptoms to identify the disease early and diagnose using appropriate diagnostic test to confirm the disease so that prompt treatment can be started and timely referral could be done in case of an emergency. We have also discussed preventive and control measures to reduce the burden of communicable disease in India.
Check Your Progress 1
i) A ii) C

Check Your Progress 2
i) B

ii) The fever attacks have three distinct stages:

1) **Cold Stage:** Headache, nausea, vomiting and chills with rigors. The temperature rises, and this stage lasts for an hour.

2) **Hot Stage:** The headache worsens and the body temperature is very high. It lasts for 2–6 hours.

3) **Sweating Stage:** The temperature drops down to normal with profuse sweating.

Check Your Progress 3
1) C

2) Home management includes the following measures:
   - drinking plenty of water
   - rest
   - limb elevation
   - wriggling of toes
   - cooling the limb with cold water.

Check Your Progress 4
1) D

Check Your Progress 5
1) Lethargy, Unconsciousness, Convulsion,

Check Your Progress 6
1) C

Check Your Progress 7
1) Aedes aegypti and Aedes Albopictus
2) i) False, ii) True, iii) False, iv) True
3) i) day time, ii) Dengue, iii) mosquito breeding