UNIT 1 EPIDEMIOLOGY OF SPECIFIC COMMUNICABLE DISEASES

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1.0 INTRODUCTION

In the previous block of this course, you read in detail about nutritional requirement of various age groups, nutritional deficiency Disorders, food borne diseases, food safety measures and rehabilitation. This unit would focus mainly on epidemiology of communicable diseases, transmission and burden of communicable diseases in India. The details of all the communicable diseases would be discussed in Unit 2, 3 and 4 of this Block. Let us read first of all vector borne diseases followed by infectious diseases and zoonotic diseases.

1.1 OBJECTIVES

After completing this unit, you will be able to:

- enumerate common communicable diseases;
- name causative organisms for communicable diseases;
• define communicable diseases; and
• explain the burden of communicable diseases in India.

1.2 VECTOR BORNE DISEASES

Let us read first of all vector borne diseases such as Malaria, Filaria, Kala-azar, Japanese Encephalitis, Dengue, Chikungunya etc.

1.2.1 Malaria

Malaria is a protozoal disease caused by Plasmodium and transmitted by female anopheles mosquito. Malaria is a common public health problem in India. Among the many species of Plasmodium, Plasmodium vivax and Falciparum are common causes of Malaria in India. According to the National Vector Borne Diseases Control Programme (NVBDCP), in 2015, 11.2 lakh cases of Malaria were reported with 7.6 lakh Falciparum cases and 287 deaths.

1.2.2 Filaria

Lymphatic Filariasis, commonly known as Filaria is caused by 3 nematode parasites– Wucheria Bancrofti, Brugia Malayi and Brugia Timori. Only Wucheria Bancrofti and Brugia Malayi are found in India. Predominantly, Wucheria bancrofti spread by culex mosquito causes– 99.4 % of the Filariasis in India. Brugia malayi infection has been reported earlier from some rural areas in seven States viz., Kerala, Odisha, Tamil Nadu, Andhra Pradesh, Madhya Pradesh, Assam and West Bengal, but now it is restricted to rural areas of Kerala. Brugia Malayi is spread through Mansonia mosquito. Filariasis affects 120 million people worldwide, with India, Indonesia, Nigeria and Bangladesh alone contributing to about 70% of the infection worldwide. Indigenous lymphatic filariasis cases are reported from 20 States/UTs namely Andhra Pradesh, Assam, Bihar, Chhattisgarh, Goa, Gujarat, Jharkhand, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Odisha, Tamil Nadu, Uttar Pradesh, West Bengal, Puducherry, Andaman & Nicobar Islands, Daman & Diu, Lakshadweep and Dadra & Nagar Haveli. From these States/UTs, a total of 250 districts have been identified to be endemic for filariasis with a population of about 600 million at risk.

1.2.3 Kala-Azar

Kala-azar or Indian Leishmaniasis is caused by the parasite – Leishmania Donovani and transmitted by Sandfly (Phlebotomus argentipes). In 2015, 8500 cases were reported with 5 deaths in India.

1.2.4 Japanese Encephalitis

Japanese encephalitis (JE) is the leading cause of viral encephalitis in Asia, with up to 70,000 cases reported annually, caused by Japanese Encephalitis virus. The disease is transmitted by culex mosquito. Japanese Encephalitis is widespread in India, its annual incidence ranges between 1714–6594, with 367–1665 deaths.

1.2.5 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. This is 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). According to the National Vector Borne Diseases Control Programme, 99913 cases of Dengue were reported in 2015, with 220 deaths.

### 1.2.6 Chikungunya

Chikungunya disease is a viral disease transmitted in humans by the bite of infected mosquitoes. 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. In 2015, a total of 27,553 cases of Chikungunya were reported in our country.

The causes of vector borne disease are summarised in the Table 1.1 as given below:

<table>
<thead>
<tr>
<th>Disease</th>
<th>Vector</th>
<th>Cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>Malaria</td>
<td>Anopheles</td>
<td>Plasmodium</td>
</tr>
<tr>
<td>Filaria</td>
<td>Culex</td>
<td>Wucheria Bancrofti</td>
</tr>
<tr>
<td>Kalaazar</td>
<td>Sandfly</td>
<td>Leishmania donovani</td>
</tr>
<tr>
<td>Japanese Encephalitis</td>
<td>Culex</td>
<td>Virus</td>
</tr>
<tr>
<td>Dengue</td>
<td>Aedes</td>
<td>Virus</td>
</tr>
<tr>
<td>Chikungunya</td>
<td>Aedes</td>
<td>Virus</td>
</tr>
</tbody>
</table>

### Check Your Progress 1

1) Define Malaria.

2) Fill in the blanks.
   i) Filaria is caused by .........................................................
   ii) Kala-azar is transmitted by ................................................
   iii) Japanese encephalitis is transmitted by ..............................
   iv) Dengue is ......................................................... viral infection.
   v) Chikungunya disease is transmitted by ......................... mosquito.

### 1.3 Infectious Diseases

After reading about the epidemiology of vector borne diseases, let us now discuss infectious disease as given below:

#### 1.3.1 Leprosy

Leprosy or Hansen’s disease is an infectious disease cause by Mycobacterium leprae. Leprosy is a chronic infection which is highly infectious, but has low pathogenicity. According to the National Leprosy Eradication Programme (NLEP), 0.86 lakh cases of Leprosy were reported in 2014, and 542 districts have eliminated leprosy.
1.3.2 Tuberculosis
Tuberculosis is a social disease with a medical manifestation, caused by Mycobacterium tuberculosis. The prevalence of Tuberculosis in India was 2.5 million in 2015.

1.3.3 Vaccine Preventable Diseases
Diphtheria, Whooping Cough, Tetanus Poliomyelitis, Measles.

a) Diphtheria
Diphtheria is caused by Corynebacterium diphtheria. In 2015, 2365 cases of Diphtheria were reported from our country.

b) Whooping cough (Pertussis)
Whooping cough or pertussis is caused by Bordetella pertussis. In 2015, 25206 cases of Pertussis were reported from India.

c) Tetanus
Tetanus is caused by Clostridium tetani. In 2015, only 2268 cases of Tetanus were reported from our country. In 2015, the World Health Organization congratulated India for its huge achievement—elimination of Maternal and Neonatal Tetanus, which means less than one case per 1000 live births.

d) Poliomyelitis
Poliomyelitis was one of the dreaded disease of the past. India has now achieved the formidable task of being Polio free since 2011.

e) Measles
Measles is caused by Measles virus and is a disease that is being targeted for elimination in India. In 2015, 25488 cases of Measles were reported from India.

1.3.4 Enteric Fever (Typhoid and Para Typhoid)
Enteric fever or Typhoid is caused by the bacteria Salmonella typhi. It occurs in all parts of the world specially in areas where quality of water supply is poor. This disease is endemic in India. In 2014, 17 lakh cases of Typhoid were reported with 429 deaths.

1.3.5 Viral Hepatitis
Hepatitis is an infectious disease of the liver caused by Hepatitis virus A, B, C, D and E. In 2014, 1.39 lakh cases of viral Hepatitis (all cause) were reported, with 407 deaths in India.

1.3.6 HIV/AIDS
AIDS or Acquired Immuno– Deficiency Syndrome is a fatal illness caused by HIV. About 8.4 lakh people were living with HIV/AIDS in India in January, 2015.

1.3.7 Sexually Transmitted Diseases
The sexually transmitted infections are managed through syndromic management and include urethral discharge, genital ulcers, inguinal bubo, vaginal discharge and cervical discharge. Urethral discharge and vaginal discharge are commonly caused by Neisseriae gonorrhoeae and Chlamydia trachomatis. About 37269 cases
of Syphilis and 74390 cases of Gonococcal infections were reported in 2014, in India.

### 1.3.8 Diarrhoea

Diarrhoea is defined as passage of loose, watery or liquid stools, usually more than three times a day. Diarrhoea can be caused by viruses like Rotavirus, Adenovirus, Enterovirus or bacteria (E. coli, Shigella, Salmonella, Vibrio cholerae) and parasites like E. histolytica, Giardia, Trichuriasis etc. In 2014, 116 lakh cases of Acute Diarrhoeal diseases were reported leading to 1323 deaths.

### 1.3.9 Respiratory Tract Infections

Respiratory tract infections may cause inflammation of respiratory tract anywhere from nose to alveoli and may be caused by bacteria like Hemophilus influenza, Klebsiella, Legionella, Staphylococcus etc. or viruses like Adenovirus, Enterovirus, Rhinovirus, Respiratory Syncytial virus etc. In 2014, 348 lakh cases of acute respiratory infections and 7 lakh cases of pneumonia with 2932 and 2661 deaths, respectively were reported in India.

### 1.3.10 Scabies

Scabies is caused by infection with a mite Sarcoptes scabiei. It causes severe itching and pimple like rashes in the body. Scabies spreads rapidly in overcrowded places through skin to skin contact between people. It is identified with Rashes i.e. pimple like eruptions especially in the skin folds on wrist, elbows, knees, the penis, breast or shoulders. There is intense itching at night time all over the body. Diagnosis is made by looking at rashes. A skin scrap may be taken to look for mites, eggs to confirm the diagnosis.

Several lotions are available to treat scabies, i.e. Benzyl benzoate 25% is applied to clean body from the neck down to the toes and left for 72 hours. All clothes, bedding, and towels used by the infected person should be washed on hot water, dry in sunlight.

### 1.3.11 Pediculosis

Infestation by lice is called pediculosis. Pediculosis is an infestation of lice and divided into three types: 1. Pediculosis capitis (Head louse infestation), 2. Pediculosis corporis (Body louse), and, 3. Pediculosis pubis (Pubic/crab louse). Lice can be acquired by direct contact. Control of lice is achieved through the use of insecticides. E.g. washing with 1% DDT for head lice. Maintaining personal and environment hygiene is very important in prevention and control of lice infestation.

#### Table 1.2: Infectious Disease with their cause

<table>
<thead>
<tr>
<th>Disease</th>
<th>Causative Organism</th>
<th>Type of Organism</th>
</tr>
</thead>
<tbody>
<tr>
<td>Leprosy</td>
<td>Mycobacterium leprae</td>
<td>Bacteria</td>
</tr>
<tr>
<td>Tuberculosis</td>
<td>Mycobacterium tuberculosis</td>
<td>Bacteria</td>
</tr>
<tr>
<td>Diphtheria</td>
<td>Corynebacterium diptheriae</td>
<td>Bacteria</td>
</tr>
<tr>
<td>Disease</td>
<td>Causative Organism</td>
<td>Type of Organism</td>
</tr>
<tr>
<td>----------------------</td>
<td>-------------------------------------------</td>
<td>------------------</td>
</tr>
<tr>
<td>Whooping Cough</td>
<td>Bordetella pertussis</td>
<td>Bacteria</td>
</tr>
<tr>
<td>Tetanus</td>
<td>Clostridium tetani</td>
<td>Bacteria</td>
</tr>
<tr>
<td>Poliomyelitis</td>
<td>Poliovirus</td>
<td>Virus</td>
</tr>
<tr>
<td>Measles</td>
<td>Measles virus</td>
<td>Virus</td>
</tr>
<tr>
<td>Enteric Fever</td>
<td>Salmonella typhi</td>
<td>Bacteria</td>
</tr>
<tr>
<td>Viral Hepatitis</td>
<td>Hepatitis virus</td>
<td>Virus</td>
</tr>
<tr>
<td>HIV/AIDS</td>
<td>HIV virus</td>
<td>Virus</td>
</tr>
<tr>
<td>Diarrhoea</td>
<td>Rotavirus, Adenovirus etc.</td>
<td>Virus</td>
</tr>
<tr>
<td></td>
<td>Vibrio cholera, Salmonella, Shigella etc.</td>
<td>Bacteria</td>
</tr>
<tr>
<td></td>
<td>Entamoeba histolytica, Giardia, Trichuris etc.</td>
<td>Parasite</td>
</tr>
<tr>
<td>Respiratory Tract Infections</td>
<td>Hemophilus influenza, Klebsiella, Legionella, Staphylococcus etc.</td>
<td>Bacteria</td>
</tr>
<tr>
<td></td>
<td>Adenovirus, Enterovirus, Rhinovirus, Respiratory Syncytial virus etc.</td>
<td>Virus</td>
</tr>
<tr>
<td>Scabies</td>
<td>Sarcoptes scabiei</td>
<td>Mite</td>
</tr>
<tr>
<td>Pediculosis</td>
<td>Louse (Pediculus)</td>
<td>Parasite</td>
</tr>
</tbody>
</table>

1.4 ZOONOTIC DISEASE– RABIES

Rabies, also known as hydrophobia is a fatal viral disease caused by Lyssa virus. It is a zoonotic disease, that is, a disease of animals that are transmitted to man. It is a disease of dogs, cats, jackals and wolves, which can be transmitted to man by lick/bite of rabid animals. A total of 104 cases of Rabies were reported in India, in 2014.

Rabies in World:

Worldwide the number of human rabies deaths is estimated to be between 35,000 and 50,000 annually. Rabies occurs in all continents except Australia and Antarctica. In Africa and Asia (with few important exceptions such as Japan and Singapore) rabies is prevalent in almost whole of the territory with a stable pattern.

Rabies in India:

Rabies is responsible for extensive morbidity and mortality in India. The estimated number of deaths per year is, around 20,000. Almost 1.8 million people annually receive post exposure prophylaxis against rabies following bite or exposure to rabid or suspected rabid animal. With the exception of Andaman & Nicobar islands and Lakshadweep islands, human cases of rabies are reported from all over the country. The cases occur throughout the year. 96% of the mortality and morbidity is associated with dog bites. Cats, wolf, jackal, mongoose and monkeys are other...
important reservoirs of rabies in India. Bat rabies has not been conclusively reported from India.

**Table 1.3 : Infectious Disease with National Programmes**

<table>
<thead>
<tr>
<th>Disease</th>
<th>National Programme</th>
<th>Drugs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Leprosy</td>
<td>NLEP</td>
<td>Rifampicin, Dapsone, Clofazimine</td>
</tr>
<tr>
<td>Tuberculosis</td>
<td>RNTCP</td>
<td>Rifampicin, Isoniazid, Ethambutol, Pyrazinamide</td>
</tr>
<tr>
<td>Diphtheria</td>
<td>UIP</td>
<td></td>
</tr>
<tr>
<td>Whooping</td>
<td>UIP</td>
<td></td>
</tr>
<tr>
<td>Tetanus</td>
<td>UIP</td>
<td></td>
</tr>
<tr>
<td>Poliomyelitis</td>
<td>Pulse Polio/ UIP/NPSP</td>
<td></td>
</tr>
<tr>
<td>Measles</td>
<td>UIP</td>
<td></td>
</tr>
<tr>
<td>Hepatitis B</td>
<td>UIP</td>
<td></td>
</tr>
<tr>
<td>Enteric Fever</td>
<td>IDSP</td>
<td>Ciprofloxacin</td>
</tr>
<tr>
<td>Diarrhoea</td>
<td>IDSP</td>
<td>ORS</td>
</tr>
<tr>
<td>Respiratory Infection</td>
<td>IDSP</td>
<td>Amoxycillin</td>
</tr>
<tr>
<td>Scabies</td>
<td></td>
<td>Benzyl Benzoate</td>
</tr>
<tr>
<td>HIV/AIDS</td>
<td>NACO</td>
<td>ART</td>
</tr>
</tbody>
</table>

**Check Your Progress 2**

1) True/False
   i) Other name for leprosy is Hansen’s disease. (True/False)
   ii) India has achieved the task of being measles’ free for more than three years. (True/False)
   iii) Other name for diphtheria is whooping cough.

2) Fill in the blanks.
   i) Tetanus is caused by .................................................................
   ii) Hepatitis is an ..............................................disease of the liver.
   iii) AIDS stands for ..............................................................................

3) Define Diarrhoea.
   ................................................................................................................
   ................................................................................................................
   ................................................................................................................
1.5 LET US SUM UP

In this unit we have mainly discussed the epidemiology of communicable diseases in India. The details about these diseases would be discussed in further units of this block. After going through this unit you can enumerate and classify various communicable diseases and have understanding of the causes of transmission etc.

1.6 MODEL ANSWERS

Check Your Progress 1

1) Malaria is a protozoal disease caused by Plasmodium and transmitted by female anopheles mosquito.

2) Fill in the blanks.
   i) Nematode parasite
   ii) Sandfly
   iii) Culex mosquito
   iv) Mosquito borne
   v) Aedes

Check Your Progress 2

1) True/False
   i) True     ii) False    iii) False

2) Fill in the blanks.
   i) Clostridium tetani
   ii) Infectious
   iii) Acquired immune deficiency virus

3) Diarrhoea is defined as passage of loose, watery or liquid stools, usually more than three times a day.

1.7 REFERENCES


