



PERIYAR ARTS COLLEGE, CUDDALORE -1
PG & RESEARCH DEPARTMENT OF ZOOLOGY
AFFILIATED TO THIRUVALLUVAR UNIVERSITY

STUDY MATERIAL

COURSE:	II B.Sc ZOOLOGY	YEAR:2020-2021	SEMESTER- III
SUBJECT PAPER	Public health and Hygiene (SBS-1)		PAPER CODE BSZO32A
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UNIT -III	Communicable diseases and their control measures such as Measles, Polio, Chikungunya, Rabies, Plauge, Leprosy and AIDS.
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hours of exposure to infection.

UNIT - III 5. Measles (Rubeola)

Measles is an eruptive fever caused by *Rubeola virus* and clinically characterised by fever and *catarrhal* symptoms followed by typical *rash*. It is a common infectious disease of childhood.

It is caused by *Rubeola virus* belonging to *Paramyxovirus group*. It is an RNA virus.

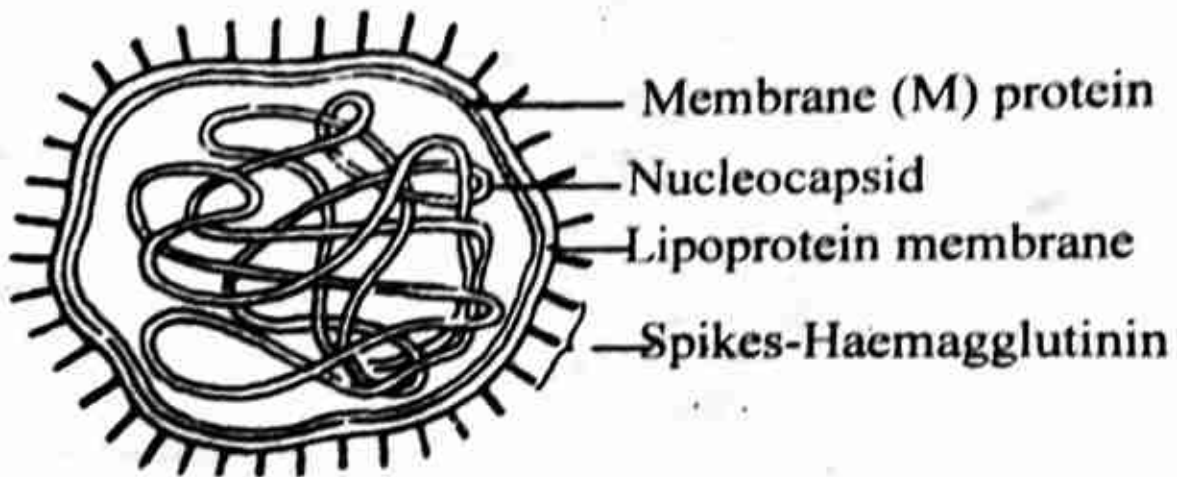


Fig.20.10: Measles virus.

Transmission occurs mainly by droplet infection, droplet nuclei and direct contact. The virus enters through *respiratory tract*.

Symptoms : Measles is characterised by fever, coughing, sneezing, running nose and redness of eyes. On the fourth day *skin rash* appears. The rash is bright pink or red in colour and is *maculopapular*. It is first noted on the face and neck. In 2 to 4 days, it is fully out affecting the body and limbs.

Measles may lead to other complications such as respiratory tract infections, such as *pneumonia, severe bronchitis, bronchiolitis, encephalitis*, etc.

Prevention : One attack of measles is followed by *life-long immunity*.

Measles may be prevented by the administration of *immunoglobulin*.

Live measles vaccine is the only type of vaccine currently recommended.

2. Poliomyelitis

Poliomyelitis is an *inflammation* of the nervous system causing *paralysis* in children. It is commonly called *polio*. It is a communicable *viral disease*.

The causative organism of polio is **Poliovirus**. It is an **enterovirus** infecting the intestine. It belongs to the **Picornavirus** (Pico = small) group. It is an **RNA virus**. It is **spherical** in shape.

It affects children below the age of 2. Male babies are more prone to attack.

The virus lives in the throat and intestine of all human beings. It is harmless in most cases. But only 1 out of 1000 children is affected.

A person infected with polio is the source of infection. The virus is passed out through nasal and throat discharges and faeces.

The usual mode of transmission is through the respiratory route or oral-intestinal route. The virus multiplies in the throat, intestine and lymph nodes. Here it does not produce any harmful effect.

Sometimes, the virus leaks out into the blood. From the blood it is carried to the spinal cord and brain. In the spinal cord it destroys the **motor neurons** of the grey matter of the anterior horn.

The disease progresses in three stages. They are **minor illness**, **major illness** (non-paralytic poliomyelitis) and **paralytic poliomyelitis**.

When the virus enters the blood stream minor illness is caused. It is characterised by **fever**, **headache**, **sore throat** and **malaise** (feeling of discomfort). It lasts for 1 to 5 days.

When the virus enters the central nervous system, the **major illness** begins. It occurs 3 to 4 days after minor illness. It is characterised by **fever**, **headache**, **stiff neck** and **meningitis**. Sometimes, the disease stops at this without causing paralysis and it is called **non-paralytic poliomyelitis**.

When the virus destroys the motor neurons of the spinal cord, the **paralytic poliomyelitis** begins. When the motor

Chikungunya

Causative Agent

- * Chikungunya virus is spread to people by the bite of an infected mosquito. *Aedes mosquito* is the vector.

Symptoms

- * Most people infected with chikungunya virus will develop some symptoms.
- * Symptoms usually begin 3-7 days after being bitten by an infected mosquito.
- * The most common symptoms are fever and joint pain. Other symptoms may include headache, muscle pain, joint swelling, or rash.
- * Chikungunya disease does not often result in death, but the symptoms can be severe and disabling.
- * Most patients feel better within a week. In some people, the joint pain may persist for months.
- * People at risk for more severe disease include newborns infected around the time of birth, older adults (65 yrs), and people with medical conditions such as high blood pressure, diabetes, or heart disease.
- * Once a person has been infected, he or she is likely to be protected from future infections.

Diagnosis

- * Blood test to look for chikungunya

Treatment

- * There is no vaccine to prevent or medicine to treat chikungunya virus.
- * Treat the symptoms

Get plenty of rest

Drink fluids to prevent dehydration

Take medicine such as acetaminophen or paracetamol to reduce fever and pain.

Rabies is caused by rabies virus belonging to *Rhabdovirus* group. It is bullet - shaped. Rabies virus commonly exists in the saliva of wild mammals like fox, bat, etc.

Stray dogs get the virus from the bite of wild mammals. The infected dog is restless. It has the tendency to bite any one who comes across. It then chooses a secluded place and dies.

When a rabid dog bites a man, the man is infected with rabies. The virus multiplies in the muscle cells and neurons of the bitten area. Then it passes along the neuron and reaches the spinal cord and brain. It moves at the rate of 3mm per hour.

The incubation period is 1 to 3 months. The incubation period is short in persons bitten on the face and long in those bitten on the legs. This may be related to the distance the virus has to travel to reach the brain.

When the virus enters the brain, the symptoms appear. At the beginning head-ache, fever, malaise, fatigue and anorexia appear. The man becomes restless and sleepless. Maniacal behaviour appears. Apathy results in.

In the brain the virus destroys the neurons which send impulses to the muscles of throat. As a result the muscles concerned with swallowing are paralysed. This causes tremendous pain during drinking. Hence the patient feels fear for drinking water. The patients develop a fear for even the sight or sound of water though he has thirst. This disease is called *hydrophobia*.

Finally death occurs due to *respiratory paralysis*.

In the infected persons the rabies virus produces a cell inclusion in the neurons of the brain. It is called *Negri body*.

Treatment : The dog, which has bitten, is observed for 10 days. If the dog survives for 10 days, there is no risk of rabies. However, it is safe to begin treatment immediately.

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Vaccination is the only treatment for rabies. The vaccine should be taken within 5 days after bite. There is no treatment after the onset of symptoms.

Rabies is treated with the following vaccines :

1. HDCS vaccine (Human diploid cell strain vaccine)
2. Egg vaccine - low immunogenic
3. Sub - unit vaccine
4. Semple vaccine - *not used in India*
5. Infant brain vaccine

Of these, HDCS vaccine is more effective. **Human diploid cell strain vaccine** is a preparation of fixed rabies virus grown on human diploid cells.

plague (Leptospirosis)

Causative Agent

- * Leptospirosis is a bacterial disease that affects humans and animals. It is caused by bacteria of the genus *Leptospira*.
- * In humans, it can cause a wide range of symptoms, some of which may be mistaken for other diseases. Some infected persons, however, may have no symptoms at all.
- * Without treatment, Leptospirosis can lead to kidney damage, meningitis (inflammation of the membrane around the brain and spinal cord), liver failure, respiratory distress, and even death.

Symptoms

- * In humans, Leptospirosis can cause a wide range of symptoms, including:
 - High fever
 - Head ache
 - Chills
 - Muscle aches
 - Vomiting
 - Jaundice (yellow skin and eyes)
 - Red eyes
 - Abdominal pain
 - Diarrhoea
 - Rash

Treatment

- * Without treatment, recovery may take several months. It is treated with antibiotics, such as doxycycline or penicillin, which should be given early in the course of the disease.

Transmission

- * The bacteria that cause leptospirosis are spread through the urine of infected animals, which can get into water or soil and can survive there for weeks to months. Many different kinds of wild and domestic animals carry the bacterium.

* These can include, but are not limited to:

- Cattle
- Pigs
- Horses
- Dogs
- Rodents
- Wild animals

* When these animals are infected, they may have no symptoms of the disease.

* Infected animals may continue to excrete the bacteria into the environment continuously or every once in a while for a few months up to several years.

* Humans can become infected through:

- Contact with urine (or other body fluids, except saliva) from infected animals.
- Contact with water, soil, or flood contaminated with the urine of infected animals.

* The bacteria can enter the body through skin or mucous membranes (eyes, nose or mouth), especially if the skin is broken from a cut or scratch.

* Drinking contaminated water can also cause infection. Outbreaks of leptospirosis are usually caused by exposure to contaminated water, such as flood waters.

* Person to person transmission is rare.

General clinical Laboratory Findings

* Erythrocyte sedimentation Rate is elevated. WBC Count range from below normal to moderately elevated.

* Liver function tests show an elevation in aminotransferases, bilirubin and alkaline phosphatase

* Renal Function Tests are usually impaired as indicated by raised plasma creatinine.

12. Leprosy

Leprosy is a chronic contact bacillary infection of man caused by *Mycobacterium leprae*. This bacillus is a slightly curved rod. $1-8\mu \times 0.2-0.5\mu$ in size. It affects chiefly the peripheral nerves. It also affects skin, mucus membranes, muscles, eye, kidneys, liver and adrenal glands. In male testis will also be affected by this disease.

- a. Leprosy is characterised by a hypopigmented patches.
- b. Partial or total loss of sensation in the affected areas.
- c. Presence of thickened nerves
- d. Presence of acid fast bacilli in skin smears.

Modes of Transmission : The transmission may take place in the following way : 1. Contact transmission 2. Droplet infection 3. Ingestion 4. Through arthropod vectors.

The incubation period is about 2-5 years. The bacilli, *Mycobacterium leprae* multiply unchecked in the skin and in some other parts. There is a rapid screening test called *leptomycin test* or *mistuda reaction*. If the person has been sensitized by the disease, a nodule develops in 3-4 days.

Treatment : Leprosy control is mostly based on chemotherapy with *DDS* (Diamino-diphenyl sulphone). The advantages of DDS are 1. Cheap and effective 2. It can be given orally 3. It is completely absorbed from the intestine. Now this disease is considered as curable, if it is detected in the initial stages.

1. AIDS ✓

(AIDS is called *acquired immunodeficiency syndrome*. It is a *viral disease*.)

It is a contagious disease. But it is not transmitted through contact.)

As it is received from an infected person, it is said to be *acquired*.)

AIDS is caused by the infection of an *RNA virus* on lymphocytes. As a result, the activity of T-helper cells is

depressed. This leads to the suppression of the immune system. Hence the name *immunodeficiency*.

As the immune system is depressed, the individual is susceptible to infection and a series of diseases develops until his death.

As the initial infection of virus paves the way for the development of a complex of diseases, it is called a *syndrome*.

AIDS was first discovered in America in 1981. Now this disease is found in all countries.)

HIV

AIDS is caused by a RNA virus called *human immunodeficiency virus* abbreviated as *HIV*. It is a class of *retrovirus*. It was discovered by *Luc Montagnier* in 1983.)

It is a *retrovirus* (group) ✓

It is an *RNA-virus*.

It is *spherical* in shape.

It consists of an *envelope*, a *capsid* and *RNA*. ✓

As the HIV has an envelope, it is an *enveloped virus*. ✓

The envelope is made up of two *lipid* layers.

The envelope is studded with spherical *glycoproteins* at regular intervals. The spherical glycoprotein has a rod-like *shaft* embedded in the envelope.

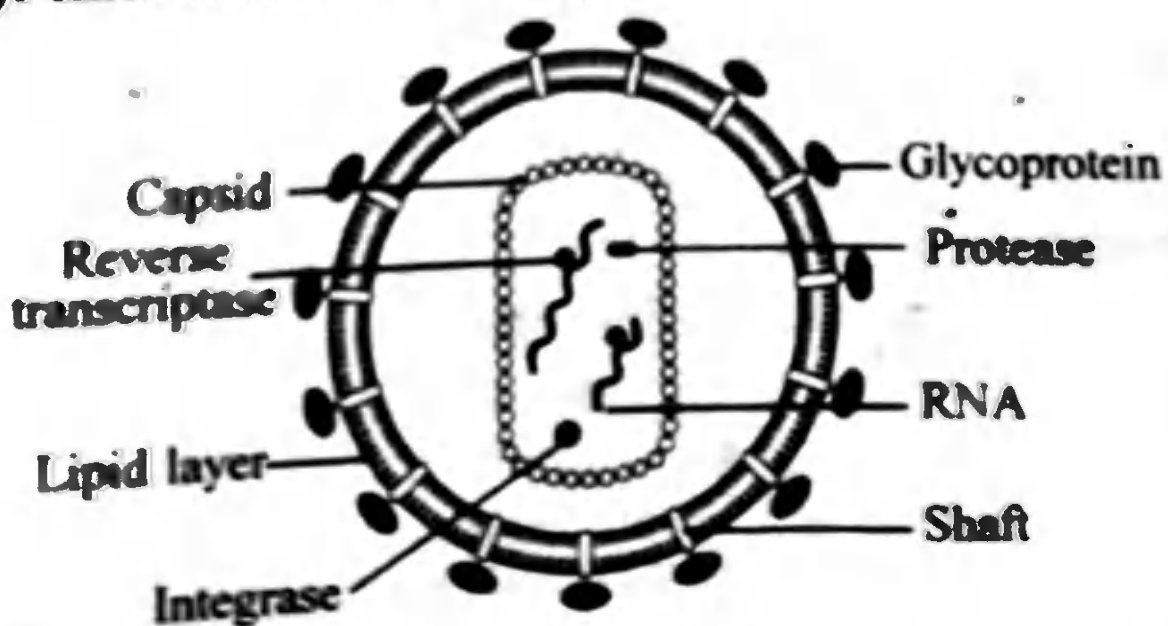


Fig. 20.7: HIV.

The *capsid* is made up of protein subunits called *capsomeres*.

HIV contains *two RNA* strands. The RNA is associated with three types of enzymes, namely two *reverse transcriptase*, a *protease* and an *integrase*.

The HIV infects T-helper cells, macrophages and monocytes. The virus enters the nucleus of the host cell. There, it uses its own reverse transcriptase and converts its RNA into DNA.

The viral DNA is integrated with the host DNA.

When the host DNA replicates, the HIV DNA also replicates and produces multiple copies of HIV DNA.

The viral DNA produces mRNA and new viral particles are synthesized. They come out of lymphocytes and infect new cells.

Transmission

HIV is transmitted by the following methods :

1. *Sexual contact*, both homosexual and heterosexual.
2. *Blood transfusion*
3. Mother to foetus through the *placenta*
4. Tissue transplantation
5. Injection with unsterile syringes and needles
6. Intravenous drug using.
7. *Breast feeding* by infected mother.
8. The AIDS is transmitted at a fast rate by the *prostitutes* and *lorry drivers*. A scientist remarked that the Government has given National Permit (NP) to lorry drivers to transmit AIDS.

Symptoms of AIDS

The AIDS patients show the following symptoms :

1. The AIDS patients initially show fever like that of *flu*.

This is followed by rash, headache, swelling of lymph glands, weight loss, *lymphadenopathy** and general malaise.

2. The WBC count is reduced. This condition is called *leukopenia*.

* *Lymphadenopathy* : Disease of the lymph node.