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314en29

29

SOME COMMON HUMAN DISEASES

In the previous lesson you have read about the diseases due to nutritional deficiencies. In this lesson, you will learn about diseases caused due to other reasons.



OBJECTIVES

After completing this lesson, you will be able to :

- *define a disease and learn its types;*
- *differentiate between parasite and pathogen;*
- *differentiate between infection and infestation;*
- *list the symptoms, causative agents, prevention and control of influenza, measles, polio, hepatitis, tuberculosis, diphtheria, leprosy, malaria, filariasis and dengue.*
- *identify certain diseases that are caused due to improper functioning of some organs of the body system;*
- *describe the causes, symptoms and prevention and cure for hypertension;*
- *list the symptoms of and methods for diagnosing coronary heart disease and suggest preventive measures;*
- *describe the cause, the symptoms, preventive and curative methods of diabetes mellitus and osteoporosis;*
- *recognize cancer as a cell-regulation disorder;*
- *define and differentiate between benign and malignant tumors;*
- *interpret the category of allergies as immune system related disorders;*
- *define the special category of sexually transmitted diseases;*

- list the causative agents, symptoms, prevention and control of syphilis, gonorrhea and AIDS;
- define drug abuse and its prevention.

29.1 DISEASES

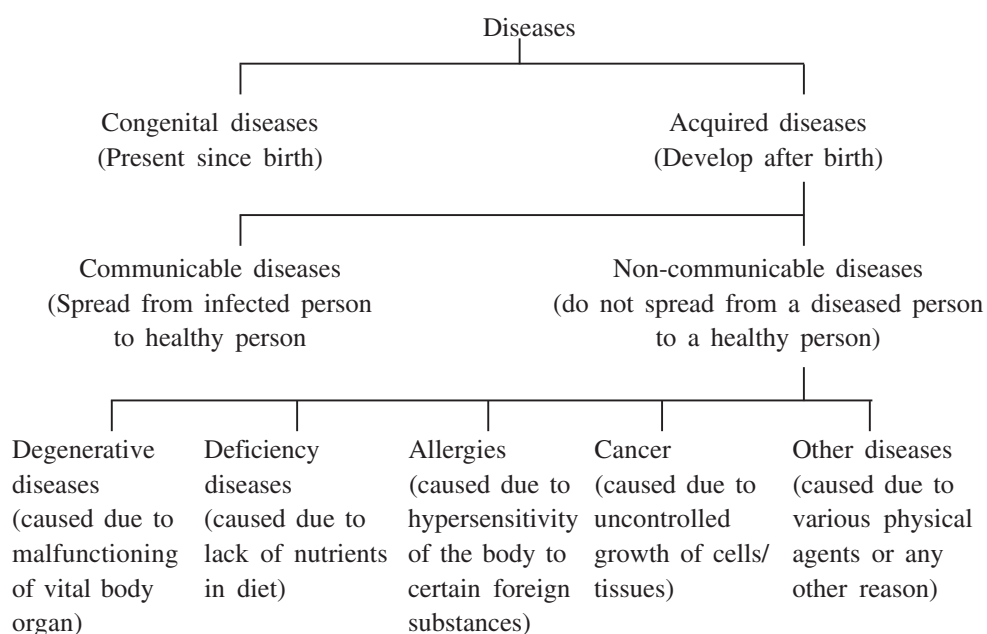
29.1 What is a disease?

Any malfunctioning process which interferes with the normal functioning of the body is called a disease. In other words, disease may be defined as a disorder in the physical, physiological, psychological or social state of a person caused due to nutritional deficiency, physiological disorder, genetic disorder, pathogen or any other reason.

29.1.1 Types of Diseases

The diseases may be classified into two broad categories (Table 29.1).

Table 29.1 Classification of human diseases



A. Congenital disease : The disease which is present from birth (e.g. hole in the heart in infants). They are caused by some genetic abnormality or metabolic disorder or malfunctioning of an organ.

B. Acquired disease : The disease which may occur after birth during one's lifetime.

Acquired diseases may generally be classified into :

- Infectious diseases :** The diseases which can be transmitted from diseased healthy person to e.g. measles.
- Degenerative diseases :** The diseases caused by the malfunction of some vital organs of the body e.g. heart failure.



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- (iii) **Deficiency diseases** : These are caused due to nutritional deficiency such as that of minerals or vitamins in the diet e.g. anaemia (Fe), Beri- beri (vitamin B). You have read about such diseases in an earlier lesson 27.
- (iv) **Cancer** : This is an abnormal, uncontrolled and unwanted growth of cells. e.g. breast cancer.

Acquired diseases are studied under two categories (Table 29.2).

- (i) **Communicable diseases** : The diseases which can be transmitted from an infected person to a healthy person.
- (ii) **Non-communicable diseases** : These diseases do not spread from an affected person to a healthy person.

Table 29.2 Differences between communicable and non-communicable diseases

Communicable diseases	Non-communicable diseases
1. Caused by some biological agents or pathogens, such as viruses, bacteria, protozoans and helminths (worms).	Caused due to some specific factor, such as malfunctioning of some vital organ, and deficiency of nutrients.
2. Spread from one person to another through contact, water, air, and food, etc.	Do not spread from one person to another by contact.
3. The concern of the diseases involves the society as these are related to community health.	The concern of the disease is restricted to the individual only.

29.1.2 Modes of Spread of Communicable Diseases

Communicable diseases spread from the infected person to a healthy person in the following ways.

Direct transmission

The pathogens of diseases infect a healthy person directly without an intermediate agent. It can take place by various means such as,

- (i) **Direct contact between the infected person and the healthy person** : Diseases like small pox, chicken pox, syphilis, gonorrhoea spread through direct contact.
- (ii) **Droplet infection** : The infected person throws out tiny droplets of mucus by coughing, sneezing or spitting. These droplets may contain the pathogen. By inhaling the air containing the droplets, a healthy person may get the infection. Diseases like common cold, pneumonia, influenza, measles, tuberculosis and whooping cough spread through droplet infection.

- (iii) **Contact with soil** contaminated with disease-causing viruses and bacteria.
- (iv) **Animal bite** : Viruses of rabies are introduced through the wound caused by the bite of rabid animals, especially dogs. The virus is present in the saliva of the rabid animals.

Indirect transmission

The pathogens of certain diseases reach the human body through some intermediate agents. It can take place by various means, which are as follows :

- (i) **By vectors such as houseflies, mosquitoes, and cockroaches.** Examples: Houseflies carry the causative organisms of cholera on their legs and mouth parts from the faeces and sputum of infected persons to food and drinks and contaminate them. When this contaminated food is taken by a healthy person, he gets the infection. Similarly, mosquitoes carry virus of dengue and malarial parasite which causes malaria.
- (ii) **Air-borne** : The pathogens may reach humans with air and dust. The epidemic typhus spreads by inhalation of dried faeces of infected fly.
- (iii) **Object borne (Fomite borne)** : Many diseases are transmitted through the use of contaminated articles, such as clothes, utensils, toys, door handles, taps, syringes and surgical instruments.
- (iv) **Water borne** : If potable water (drinking water) is contaminated with pathogens of diseases such as cholera, diarrhoea, hepatitis or jaundice, it reaches a healthy person upon consuming such water.

29.2 SOME IMPORTANT TERMS TO REMEMBER

Pathogen : A living organism which causes a disease.

Parasite : An organism which gets food and shelter from host.

Host : The living body on or inside which the disease-producing organism takes shelter.

Infestation : Presence of a large number of parasitic organisms on the surface of body of the host or on the clothings.

Vector : It is an organism which harbours a pathogen and may pass it on to another person to cause a disease (Mosquitoes harbour malarial parasite and transmits it to humans).

Carrier : It is an organism which itself does not harbour the pathogen but physically transmits it to another person (Housefly is the carrier of cholera germs).

Reservoir : An organism which harbours pathogens in large numbers that do not cause any suffering to it.

Epidemic : Spreading of a disease among a large number of people causing a huge loss of life in the same place for some time e.g. plague.

Endemic : A disease which is regularly found among a particular group of people e.g. goitre, restricted to a certain locality or a country.



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Pandemic : A disease which is found all over the world e.g. AIDS.

Interferon : Type of proteins produced by infected cells of the body when attacked by a virus, which act to prevent the further development of the same virus.

Inoculation : Introduction of antigenic material inside the body to prevent suffering from a disease.

Vaccination : Injection of a weak strain of a specific bacterium (Vaccine) in order to secure immunity against the corresponding disease. It is also called immunisation.

Incubation period : The period between entry of pathogen inside a healthy body and appearance of the symptoms of the disease.

Symptoms : Specific morphological or physiological expressions which appear on the diseased organism and help in the identification of the disease.



INTEXT QUESTIONS 29.1

1. Define the term disease.
2. Give appropriate terms for
 - (i) the kind of disease which is present from birth..
 - (ii) disease caused by malfunctioning of vital organs.
3. Name any two communicable and any two non-communicable diseases in humans
.....
4. What does infestation mean?
.....

29.3 COMMUNICABLE DISEASES (INFECTIOUS DISEASES)

The diseases which spread from one diseased person to another through contaminated food, water or contact or through insecticides, and animals are called the communicable diseases. These are caused by different causative agents (pathogens).

29.3.1 Diseases caused by viruses

1. Chicken pox

Pathogen : Chicken pox virus (varicella)

Mode of transmission : By contact or through scabs

Incubation period : 12-20 days

Symptoms

- (i) Fever, headache and loss of appetite
- (ii) Dark red-coloured rash on the back and chest which spreads on the whole body. Later, rashes change into vesicles.

- (iii) After few days these vesicles start drying up and scabs (crusts) are formed.
- (v) These scabs start falling (infective stage)

Prevention and cure

There is no vaccine against chicken pox as yet. But precautions must be taken as follows:

- (i) The patient should be kept in isolation.
- (ii) Clothings and utensils, used by the patient should be sterilised.
- (iii) Fallen scabs should be collected and burnt.

One attack of chicken pox gives life long immunity to the person recovered from this disease.

2. Measles

Pathogen : Virus (*Rubeola*)

Mode of transmission : By air

Incubation period : 3-5 days

Symptoms

- (i) Common cold
- (ii) Appearance of small white patches in mouth and throat.
- (iii) Appearance of rashes on the body.

Prevention and cure

- (i) The patient should be kept in isolation.
- (ii) Cleanliness should be maintained.
- (iii) Antibiotics check only the secondary infections which can easily recur.

3. Poliomyelitis

Pathogen : Polio Virus

Mode of transmissions : Virus enters inside the body through food or water.

Incubation period : 7-14 days

Symptoms

- (i) The virus multiplies in intestinal cells and then reaches the brain through blood.
- (ii) It damages brain and nerves and causes infantile paralysis.
- (iii) Stiffness of neck, fever, loss of head support.

Prevention and Cure

Polio vaccine drop (oral polio vaccine, OPV) are given to children at certain intervals.

Pulse polio programme is organised in our country to give polio vaccine to children.



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**Notes****4. Rabies (also called hydrophobia)****Pathogen :** Rabies virus**Mode of Transmission :** Bite by a rabid dog.**Incubation period :** 10 days to 1-3 months depending upon the distance of bite from Central Nervous System (CNS), that is the brain or spinal cord.**Symptoms**

- (i) Severe headache and high fever.
- (ii) Painful contraction of muscles of throat and chest.
- (iii) Choking and fear of water leading to death.

Prevention and Cure

- (i) Compulsory immunisation of dogs.
- (ii) Killing of rabid animals.
- (iii) Anti-rabies injections or oral doses are given to the person bitten by a rabid animal.

5. Hepatitis**Pathogen :** Hepatitis B virus.**Mode of Transmission :** Mainly through contaminated water.**Incubation Period :** Generally 15-160 days.**Symptoms**

- (i) Bodyache.
- (ii) Loss of appetite and nausea.
- (iii) Eyes and skin become yellowish, urine deep yellow in colour (due to bile pigments).
- (iv) Enlarged liver.

Prevention and Cure

- (i) Hepatitis B vaccine is now available in India.
- (ii) Proper hygiene is to be observed.
- (iii) Avoid taking fat rich substances.

6. Influenza

Influenza, commonly known as 'flu' is an illness caused by viruses that infect the respiratory tract. Compared to common cold, influenza is a more severe illness.

Causes

Influenza is caused by a virus which attacks our body's cells, resulting in various effects depending on the strain of the virus.

There are many strains of influenza virus. The virus mutates all the time and new variations (strains) arise. This constant changing enables the virus to evade the immune system of its host. Unfortunately immunity against one strain (which is conferred by exposure or immunisation) does not protect against other strains. A person infected with influenza virus develops antibodies against that virus; as the virus changes, the antibodies against the virus do not recognize the changed virus, and influenza can recur, caused by the changed or mutated virus.

Symptoms

Typical symptoms of influenza include:

- (i) fever (Usually 100° F to 103° F in adults and often even higher in children).
- (ii) respiratory tract infection symptoms such as, cough, sore throat, running nose, headache, pain in the muscles, and extreme fatigue.

Although nausea and vomiting and diarrhoea can sometimes accompany Influenza infection, especially in children, gastrointestinal symptoms are rarely prominent.

Most people who get flu, recover completely in 1 to 2 weeks, but some people develop serious and potentially life-threatening complications, such as pneumonia.

Treatment and Control

- (i) Much of the illness and death caused by influenza can be prevented by annual influenza vaccination. Influenza vaccine is specifically recommended for those who are at high risk for complications with chronic diseases of the heart, lungs or kidneys, diabetes, or severe forms of anaemia.
- (ii) The persons suffering from influenza should
 - drink plenty of fluids
 - take symptom relief with paracetamol, aspirin (not in children under the age of 16) or ibuprofen as recommended by the doctor.
 - Consult doctor immediately for treatment.

7. Dengue

Dengue is an acute fever caused by virus. It is of two types: (i) Dengue fever, (ii) Dengue hemorrhagic fever.

Dengue fever is characterized by an onset of sudden high fever, severe headache, pain behind the eyes and in the muscles and joints.

Dengue hemorrhagic fever is an acute infectious viral disease. It is an advanced stage of dengue fever. It is characterized by fever during the initial phase and other symptoms like headache, pain in the eye, joint pain and muscle pain, followed by signs of bleeding, red tiny spots on the skin, and bleeding from nose and gums.

How does Dengue spread?

Dengue spreads through the bite of an infected *Aedes aegypti* mosquito. The transmission of the disease occurs when a mosquito bites an infected person and subsequently bites a healthy person. In doing so, it transmits blood containing the



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virus to the healthy person and the person becomes infected with dengue. The first symptoms of the disease occur about 5 to 7 days after the infected bite.

Aedes mosquito rests indoors, in closets and other dark places, and is active during day time. Outside, it rests where it is cool and shaded. The female mosquito lays her eggs in stagnant water containers such as coolers, tyres, empty buckets, in and around homes, and other areas in towns or villages. These eggs become adults in about 10 days.

Incubation period

The time between the bite of a mosquito carrying dengue virus and the start of symptoms averages 4 to 6 days, with a range of 3 to 14 days.

Diagnosis

Diagnosis is made through blood tests by scanning for antibodies against dengue viruses. In addition the blood platelet counts also get drastically reduced in the infected person.

Symptoms

Symptoms of Dengue fever

- (i) Sudden onset of high fever, generally 104-105 °F (40 °C), which may last 4-5 days.
- (ii) Severe headache mostly in the forehead.
- (iii) pain in the joints and muscles, body aches.
- (iv) Pain behind the eyes which worsens with eye movement.
- (v) Nausea or vomiting.

Symptoms of Dengue hemorrhagic fever

These include symptoms similar to dengue fever, plus other symptoms such as:

- (i) Severe and continuous pain in the abdomen.
- (ii) Rashes on the skin.
- (iii) Bleeding from the nose, mouth, or in the internal organs.
- (iv) Frequent vomiting with or without blood.
- (v) Black stools due to internal bleeding.
- (vi) Excessive thirst (dry mouth).
- (vii) Pale, cold skin, weakness.

Prevention

Following steps can be taken to prevent spread of dengue fever:

- (i) Avoid water stagnation for more than 72 hours so that the mosquitoes do not breed there.
- (ii) Prevent mosquito breeding in stored water bodies, like ponds, and wells.

- (iii) Destroy discarded objects like old tyres and bottles, as they collect and store rain water.
- (iv) Use mosquito repellents and wear long sleeved clothes to curtail exposure.
- (v) Use mosquito nets, also during daytime.
- (vi) Avoid outdoor activities during dawn or dusk when these mosquitoes are most active.
- (vii) Patients suffering from dengue fever must be isolated for at least 5 days.
- (viii) Report to the nearest health centre for any suspected case of Dengue fever.

Treatment for dengue and dengue hemorrhagic fever

There is no specific treatment for dengue fever. Persons with dengue fever should rest and drink plenty of fluids. Dengue hemorrhagic fever is treated by replacing lost fluids. Some patients need blood transfusions to control bleeding.



INTEXT QUESTIONS 29.2

1. How does chicken pox spread?
.....
2. Mention the most obvious symptom of measles.
.....
3. Which organ system of the body is affected by the polio virus?
.....
4. Name the causative organism of hydrophobia.
.....
5. Which mosquito spreads dengue?
.....

29.3.2 Diseases caused by Bacteria

1. Tuberculosis

Pathogen : A bacterium (*Mycobacterium tuberculosis*).

Mode of Transmission : airborne-discharged through sputum, cough and sneeze, of the infected person.

Incubation period : 2-10 weeks during which the bacteria produce a toxin, tuberculin.

Symptoms

- (i) Persistent fever and coughing.
- (ii) Chest pain and blood comes out with the sputum.
- (iii) General weakness.



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Prevention and Cure

- (i) Isolation of patient to avoid spread of infection.
- (ii) BCG vaccination is given to children as a preventive measure.
- (iii) Living rooms should be airy, neat and with clean surroundings.
- (iv) Antibiotics be administered as treatment.

2. Typhoid

Pathogen : A Bacillus rod-shaped bacterium (*Salmonella typhi*)

Mode of transmission : Through contaminated food and water

Incubation period : About 1-3 weeks

Symptoms

- (i) Continuous fever, headache, slow pulse rate.
- (ii) Reddish rashes appear on the belly.
- (iii) In extreme cases, ulcers may rupture resulting in death of the patient.

Prevention and Cure

- (i) Anti-typhoid inoculation should be given.
- (ii) Avoid taking exposed food and drinks.
- (iii) Proper sanitation and cleanliness should be maintained.
- (iv) Proper disposal of excreta of the patient.
- (v) Antibiotics should be administered.

3. Cholera

It often breaks out among people in crowded areas and the areas with poor sanitary conditions.

Pathogen : Comma shaped bacterium (*Vibrio cholerae*)

Mode of transmission : Contaminated food and water. Housefly is the carrier.

Incubation period : 6 hours to 2-3 days.

Symptoms

- (i) Acute diarrhoea and watery stool.
- (ii) Muscular cramps.
- (iii) Loss of minerals through urine.
- (iv) Dehydration leads to death.

Prevention and cure

- (i) Cholera vaccination should be given.
- (ii) Electrolytes (Na, K, sugar) dissolved in water should be given to the patient to check dehydration (In market it is available as ORS—oral rehydration solution).
- (iii) Proper washing and cooking of food.



- (iv) Proper disposal of vomit and human excreta.
- (v) Flies should not be allowed to sit on eatables and utensils.

4. Diphtheria

This disease generally occurs in children of 1-5 years of age.

Pathogen : Rod-shaped bacterium (*Corynebacterium diphtheriae*)

Mode of Transmission : Through air (droplet infection)

Incubation period : 2-4 days

Symptoms

- (i) Slight fever, Sore throat and general indisposition.
- (ii) Oozing semisolid material in the throat which develops into a tough membrane. The membrane may cause clogging (blocking) of air passage, resulting into death.

Prevention and cure

- (i) Immediate medical attention should be given.
- (ii) Babies should be given DPT vaccine.
- (iii) Sputum, oral and nasal discharges of the infected child should be disposed off.
- (iv) Antibiotics may be given under doctor's supervision.
- (v) Isolation of the infected child.

5. Leprosy

Pathogen : A bacterium (*Mycobacterium leprae*)

Mode of transmission : Prolonged contact with the infected person. Nasal secretions are the most likely infectious material for family contacts.

Incubation period : 1-5 years

Symptoms

- (i) Affects skin.
- (ii) Formation of nodules and ulcer.
- (iii) Scabs and deformities of fingers and toes.
- (iv) Infected areas lose sensation.

Prevention and Cure

- (i) The children should be kept away from parents suffering from leprosy.
- (ii) Some medicine may arrest the disease and prevent from spreading.



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INTEXT QUESTIONS 29.3

1. Name the causative bacterium of (i) TB (ii) Typhoid (iii) Cholera.
.....
2. State the most obvious symptom of diphtheria.
.....
3. What is the mode of transmission of leprosy.
.....

29.3.3 Diseases caused by protozoans

1. Malaria

Pathogen : Malarial parasite (different species of *Plasmodium*)

Mode of transmission : By bite of female *Anopheles* mosquitoes

Incubation period : Approximately 12 days

Symptoms

- (i) Headache, nausea and muscular pain.
- (ii) Feeling of chilliness and shivering followed by fever which becomes normal along with sweating after some time.
- (iii) The patient becomes weak and anaemic.
- (iv) If not treated properly secondary complications may lead to death.

Prevention and cure

- (i) Fitting of double door and windows (with “Jali” i.e. wire mesh) in the house to prevent entry of mosquitoes.
- (ii) Use of mosquito net and mosquito repellents.
- (iii) No water should be allowed to collect in ditches or other open spaces to prevent mosquito breeding.
- (iv) Sprinkling of kerosene oil in ditches or other open spaces where water gets collected.
- (v) Antimalarial drugs to be taken.

2. Amoebiasis (Amoebic dysentery)

Pathogen : *Entamoeba histolytica*

Mode of transmission : Contaminated food and water



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Symptoms

- (i) Formation of ulcers in intestine.
- (ii) Feeling of abdominal pain and nausea.
- (iii) Acute diarrhoea and mucus in stool.

Prevention and cure

- (i) Proper sanitation should be maintained.
- (ii) Vegetables and fruits must be properly washed before eating.
- (iii) Antibiotics may be given to the patients.

29.3.4 Diseases caused by worms (helminths)**1. Filariasis****Pathogen :** Filarial worm (*Wucheraria bancrofti*)**Mode of transmission :** Bites of mosquitoes - *Aedes* and *Culex*.**Symptoms**

- (i) Fever
- (ii) Collection of endothelial cells and metabolites in the wall of lymph vessels.
- (iii) Swelling takes place in certain parts of the body like legs, breasts, and scrotum.
- (iv) Swelling of legs which appear as legs of elephant, so this disease is also called elephantiasis (Fig. 29.1)

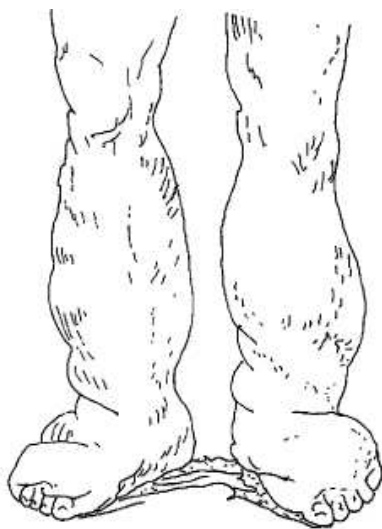


Fig. 29.1 Patient suffering from Elephantiasis.

Prevention and cure

- (i) Mesh doors and windows in the house to check the entry of mosquitoes.
- (ii) The water collected in tanks or other articles should be properly covered.



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- (iii) Sprinkling of kerosene in ditches.
- (iv) Drugs may be administered.



INTEXT QUESTIONS 29.4

1. Which mosquito carries stages of life history of the malarial parasite?
.....
2. Which protozoan causes amoebic dysentery?
.....
3. Name the disease cause by *Wuchrereria bancrofti*.
.....

29.4 NON-COMMUNICABLE DISEASES

1. Diabetes mellitus

The disease can be diagnosed by blood test or urine test.

Causes

- (i) Less secretion of insulin hormone from the pancreas.
- (ii) Mental stress
- (iii) Through heredity from parents to children.

Symptoms

- (i) More glucose in blood.
- (ii) Excessive and frequent passing of urine.
- (iii) Feeling thirsty and hungry frequently.
- (iv) Reduced healing capacity of injury.
- (v) General weakness of the body.
- (vi) In extreme cases diabetic coma can take place making the patient unconscious.

Prevention and cure

- (i) Control the excessive weight of the body.
- (ii) A regulated and controlled diet is to be taken.
- (iii) The food should not contain sugar and much carbohydrates.
- (iv) Injection of insulin before meals, if required (only on doctor's prescription).

2. Cardio vascular diseases

Common Causes

- (i) Deposition of cholesterol (a kind of fat) in the walls of coronary arteries which restrict the flow of blood to the heart muscles. This leads to heart attack.

- (ii) Due to reduced blood supply, and reduced oxygen available to the muscles, heart's efficiency is affected.
- (iii) Due to stress and strain.
- (iv) Obesity (over weight).

(a) Hypertension : (high blood pressure)

Symptoms

- (i) Persistent high blood pressure (BP)
- (ii) It may damage the arteries of kidney.
- (iii) In extreme cases the arteries may burst or blindness may be caused.
- (iv) It may also cause paralysis.

Prevention and Cure

- (i) Do not build up mental tension.
- (ii) Low fat diet should be taken.
- (iii) Weight of the body must be kept under control.
- (iv) Good eating habits should be cultivated
- (v) Medicines may be taken as per doctor's advice.

(b) Coronary heart disease

Symptoms

- (i) Severe pain in the chest gasping for breathe.
- (ii) Intense nausea and vomiting.
- (iii) Lot of sweating takes place.
- (iv) Blood clot may be formed within the blood vessels.

Prevention and Cure

- (i) A diet low in saturated fats may control the formation of cholesterol.
- (ii) Sound eating habits should be developed.
- (iii) Over weight should be checked.
- (iv) Avoid smoking, alcoholic drinks and drugs.
- (v) Take treatment under a qualified doctor.
- (vi) Electrocardiogram (ECG) can diagnose the disease.
- (vii) By-pass surgery is performed in extreme cases.

3. Osteoporosis

Osteoporosis is an age dependent disorder with loss of the normal density of bone. The bones become fragile and are easily fractured. Bones that are affected by osteoporosis can fracture with only a minor fall or injury. Elderly men and women are most susceptible because of hormonal changes which occur with advancing age.



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Symptoms

- (i) The persons suffering from osteoporosis may not know about their condition for a long time, because osteoporosis doesn't cause clear cut symptoms and one may not realise till a bone fracture.
- (ii) The symptoms of osteoporosis are related to the location of the fracture.
- (iii) Fractures of the spine can cause severe 'band like' pain that radiates around from the back to the side of the body. Repeated spine fractures can cause chronic lower back pain, as well as curving of the spine, which gives the individual a hunched-back appearance.
- (iv) Some patients with osteoporosis develop stress fractures of the feet while walking or stepping off. Hip fractures typically occur as a result of a fall. With osteoporosis, hip fractures can occur upon even minor accidents. Hip fractures may take a very long time to heal because of poor bone quality.

Treatment

- (i) Patients suffering from osteoporosis are generally treated with vitamin D and calcium supplements. In addition they are advised bed rest so that the condition does not worsen.
- (ii) Changes to lifestyle and diet are also recommended. The patients are advised to take calcium either via dietary means or via supplements in the form of tablets. Since body absorbs about 500 mg calcium at a given time, the calcium intake should be spread throughout the day.
- (iii) Exercise also helps to protect persons from the risk of getting osteoporosis. However, it is important to do exercises for osteoporosis under the guidance of a professional physiotherapist.

4. Cancer

It is the uncontrolled and unwanted growth of cells.

Cause

- (i) No definite cause has been arrived at so far. However, it is found that body has proto-oncogenes. These are activated by some substances or stimulus, which convert these into active cancer-causing oncogenes.
- (ii) Heavy smoking and alcoholism.
- (iii) Chewing of tobacco.
- (iv) Consistent irritation of skin or repeated injury at the same point.

Cancer is a kind of tumorous growth. Tumours can be classified into two categories :

(a) Benign tumour

It remains confined to the place of origin and does not spread to other body parts. It is relatively harmless.

(b) Malignant tumour

It spreads to other parts of the body and growth is rapid. This is serious and may cause death of the patient.

Symptoms

- (i) Persistent lump or thickening in tissues, specially in tongue, breast and uterus.
- (ii) Any irregular bleeding or blood-tinged discharge from any body opening.
- (iii) Any sore that does not heal quickly.
- (iv) Change in the form of mole or wart.
- (v) Persistent hoarseness in voice, cough or difficulty in swallowing.

Prevention and cure

- (i) Cancer check up should be done once a year.
- (ii) Treatment should be taken under medical advice.
- (iii) Avoid smoking, taking alcohol and chewing of tobacco.
- (iv) Observe regularity in life style to keep body healthy.

5. Allergy

- (i) Includes a group of non-infectious diseases.
- (ii) No definite cause is known
- (iii) It is believed that they occur due to hypersensitiveness of certain individuals to foreign matter (allergens) which may enter inside the body.
- (iv) Symptoms may be sneezing, gasping, running of eyes, irritation of throat or trachea.
- (v) Allergens may be pollen grains, feathers, some animals or insects, drugs, medicines and odour.

**INTEXT QUESTIONS 29.5**

1. Why is diabetes called a hereditary disease?
.....
2. What happens to the blood pressure in persons with hypertension?
.....
3. State one point of difference between malignant and benign tumour.
.....

29.5 SEXUALLY TRANSMITTED DISEASES

The diseases that are transmitted through sexual contact are known as sexually transmitted diseases. Sexually transmitted diseases are those diseases that are transmitted via the mucous membrane and secretions of the sexual organ, throat and the rectum. Syphilis, gonorrhoea, and AIDS are some sexually transmitted diseases.

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29.5.1 AIDS (Acquired Immuno Deficiency Syndrome)

It is a pandemic disease. The word “immuno deficiency” signifies that the immune system becomes very weak. It is a disease of cell-mediated immune system of the body.

Lymphocytes are the main cells of the immune system i.e. T-lymphocytes and B-lymphocytes. ‘Helper T’ lymphocytes play a great role in regulating the immune system. Damages to or destruction of ‘Helper’ lymphocytes leads to the development of a cellular immune deficiency which makes the patient susceptible to wide variety of infections.

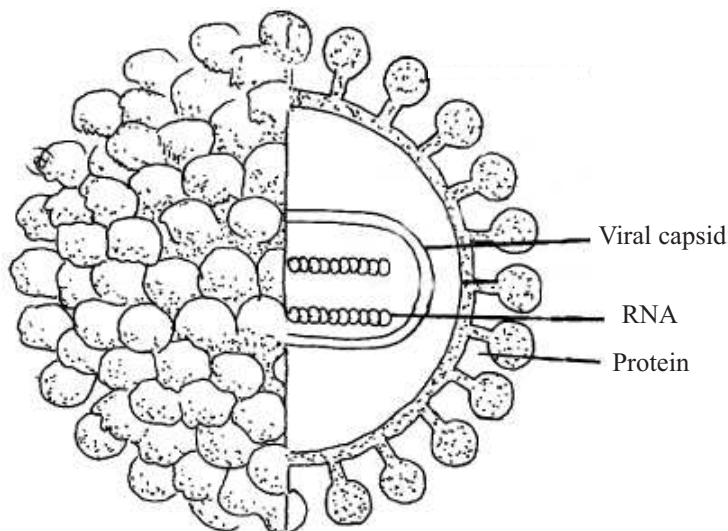


Fig. 29.2 Human Immunodeficiency Virus (HIV)

Mode of transmission : AIDS may be transmitted through any of the following means :

- (i) Sexual contact with the affected person. In India, the most common route of HIV transmission is through unprotected heterosexual sex.
- (ii) Using the same syringe that was used for affected person.
- (iii) Blood transfusion which contains human immuno deficiency virus.
- (iv) Organ transplantation of the affected person.
- (v) Artificial insemination.
- (vi) From mother to new born baby during the process of giving birth.

Incubation period : The average period is 28 months though it may range between 15 to 57 months

Symptoms : The sufferer may show one or more of the following symptoms :

- (i) A type of lung disease develops (tuberculosis).
- (ii) A skin cancer may be observed.
- (iii) Nerves are affected.
- (iv) Brain is badly damaged with the loss of memory, ability to speak and to think.

- (v) The number of platelets (thrombocytes) becomes less which may cause haemorrhage.
- (vi) In severe cases the patient shows swollen lymph nodes, fever and loss of weight. A full blown (disease at its peak) AIDS patient, may die within three years.

Prevention and cure

No medicine or vaccine is known to be available against HIV infection. Therefore, care has to be taken through following measures:

- (i) There should not be any sexual contact with the person who has HIV infection or STI. Since STI causes some damage to the genital area and mucous layer, and thus facilitates the entry of HIV into the body.
- (ii) Use disposable syringe and needle.
- (iii) The blood to be transfused to the needy person, should be free from HIV germ.
- (iv) Prostitution and homosexuality should be avoided.
- (v) Condom should always be used during intercourse.

Control

AIDS can be detected by ELISA test.

There are three points which may be important to control STD.

- (i) **Partner notification :** Identification of potential infected contact, examination and treatment.
- (ii) **Education of STD :** This should be a part of general education.
- (iii) **Screening for STD :** Serological screening of groups, such as, blood donors, women before giving birth.

Facts about HIV transmission

- HIV is a weak virus and hard to get infected with. It cannot be transmitted through air or water outside the human body.
- A person cannot get AIDS by hugging or sneezing of an infected person, insect bites (including mosquito), sharing the same comb, plates, glass, handkerchiefs, knives or cutlery.
- A person cannot get AIDS by using public toilets, swimming pools, showers and telephones.
- HIV cannot be transmitted by being near to someone, touching someone or working with someone who is suffering from AIDS.



INTEXT QUESTIONS 29.6

1. How is HIV transmitted? Mention any three ways of infection.

.....



Notes



Notes

2. Mention any two methods to prevent AIDS.

.....

3. Write full form of HIV.

.....

4. Give any two symptoms of AIDS.

.....

5. Mention three general points the knowledge of which may control STD.

.....

29.5.2 Syphilis

Causative organism

Treponema pallidum (a long corkscrew bacteria)

Mode of spread

Sexual contact with the infected person

Incubation period

Symptoms of the disease occur in about 10-90 days after contraction, but generally noticed in 3-4 weeks after getting infected with the bacteria.

Symptoms

Symptoms of syphilis occur in stages. The common symptoms of syphilis include.

- (i) Fever, and sores on the skin, in the throat and urinogenital areas especially vagina or penis, anus, rectum and mouth. Sores are firm, round and often painless.
- (ii) Rashes on hands, feet and palms.
- (iii) White patches in the mouth.
- (iv) Acne-like warts in the groin area.
- (v) Hair fall in patches from infected areas.
- (vi) The last three symptoms can be very serious. They often become internal and affect organs like brain, nerves, liver, eyes, blood vessels, bones and joints, which show up after about 10 years of getting the infection. It can lead to paralysis, blindness, dementia and sterility.

Prevention and cure

- (i) Having sexual intimacy with only one person.
- (ii) Avoiding prostitution and homosexuality.
- (iii) Practising abstinence, and use condoms.
- (iv) Taking appropriate medical treatment, and maintaining personal hygiene.



29.5.3 Gonorrhoea

Gonorrhoea is a sexually transmitted disease that often involves urethra, vagina or penis, cervix, anus, and throat, as its target sites.

Causative organism

A gonococcus bacterium, *Neisseria gonorrhoeae*. It grows and multiplies quickly in warm moist areas of the body, such as the cervix, rectum and mouth.

Modes of spread

Having multiple sex partners increases the risk of contracting it. Any kind of unprotected sex is always a risk. Any kind of contact of sores with an infected person is also risky.

Incubation period

About 2-5 days after getting infection.

Symptoms

- (i) Inflammation of mucous membrane in the urinogenital tract.
- (ii) Burning sensation while passing out urine and urethral discharge.
- (iii) Rectal discomfort.
- (iv) Pain in the joints.
- (v) Rashes on palms, Mild sore throat
- (vi) In females, it may cause sterility

Prevention and cure

- (i) Having sexual contact with only one person.
- (ii) Avoiding prostitution and homosexuality.
- (iii) Taking antibiotics, such as penicillin injection or appropriate medicines at the appropriate time as per Doctor's advice.

In males, gonorrhoea primarily affects the urethra, anus, throat, joints and eyes. Most victims of this disease are teenagers and young adults. One of the advanced complications of gonorrhoea is gonococcal septicemia (blood poisoning).

29.6 DRUG ABUSE AND ITS PREVENTION

What is a drug

A drug is a chemical substance that changes the way our body and mind work. A pharmaceutical preparation or a naturally occurring substance used primarily to alter the physical or mental functioning of an individual, is called a drug.

What is drug abuse

When drugs are taken for medical reasons to treat or cure disease both physical and mental, they are called *medications or therapeutic drugs*.

Drug abuse occurs when drugs are taken without medical reasons and without medical supervision, especially when they are taken in an amount, strength, frequency, or manner that damages the physical and mental functioning of the individual. Cough syrups, pain killers, and tranquillizers are some common medicines that are often abused.



Notes

Drug abuse also occurs when certain chemicals that have no medical use or benefits are taken, such as sniffing glue and solvents. The extent of drug abuse depends on the quantity of the drug being taken, and the method and frequency of its consumption. Drug abuse leads to many serious physical, emotional, and social problems.

What are the effects of drug abuse?

Drug abuse leads to a number of short-term and long-term effects that are detrimental to health:

- *Short-term effects* : These are the effects that appear instantly or a few minutes after the intake of drugs. The effects include a sense of well-being and a pleasant drowsiness.
- *Long-term effects* : Constant and excessive use of drugs over a long period can cause both physical and mental damage and illness. This includes failure in academic studies, employment, and interpersonal relationship; financial ruin; increased risk of contracting STIs; and increased risk of being involved in vehicular accidents. Addicts stop thinking of everything in life except when and how they will get their next drug dose. They will do anything for the dose, including committing crimes such as theft and in certain case even murder.



Some Basic Facts

Teenagers sometimes try a smoke or drink just to see how it feels, but they do not start using drugs on a regular basis. What is the harm in trying drugs just to see how it feels?

Ideally, there is no need to try out a smoke or drink.

But there is a great difference between “trying out” smoking or drinking as compared to drugs.

Smoking and drinking once only or very occasionally does not always lead to addiction. But drugs are very powerful chemicals that can cause profound alterations in the metabolism of the body and in the chemistry of the brain. Even a single dose of a powerful drug can start the addiction process. When one’s mind and body becomes addicted to drugs, stopping drugs produces very unpleasant and distressing mental and physical symptoms. This makes the addict persist with the usage of the drug. Addicts cannot give up their habit unless they get medical treatment and counselling.

You should not boast about your strong will power and assume that you can experiment with drugs without becoming addicted. **ALWAYS KEEP AWAY** from drugs. Do not allow yourself to succumb to pressure by friends and acquaintances. If you remain firm in your resolve, you can prevent your life from being ruined.





Some Basic Facts

What are Reproductive Tract Infections (RTIs)?

RTIs are infections of the upper and lower reproductive tracts of both sexes. Agents of infection include bacteria, viruses, and protozoa. Not all RTIs are sexually transmitted; some may occur due to an imbalance of the bacteria normally found in the reproductive tract and poor personal hygiene.



Notes



Some Basic Facts

Is it possible for a person to have an RTI (Reproductive Tract Infection) without knowing about it?

Symptoms of RTIs in men are visible, and hence they become aware that their sexual organs have been infected.

However, RTIs in women sometimes can be *asymptomatic*. This means that signs or symptoms are not experienced even though the infection is active. Hence women often do not know that they have RTI.



INTEXT QUESTIONS 29.7

1. Name the pathogen that causes syphilis.

.....

2. Mention any two symptoms of the disease gonorrhoea.

.....

3. Give the main method of checking syphilis.

.....



WHAT YOU HAVE LEARNT

- Diseases are broadly classified into two categories—Acquired (Occur after birth) and congenital (present from birth).
- Infectious diseases are transmitted from a diseased person to a healthy person and degenerative diseases are due to malfunctioning of some organs.
- Cancer is uncontrolled growth of cells.



Notes

- Acquired diseases are studied in two categories of communicable and non-communicable diseases.
- Communicable diseases are transmitted and may be caused by virus, bacteria, protozoa or helminths (worms).
- Non-communicable diseases are not transmitted from a diseased person to a healthy person.
- diseases which spread by sexual contact are called sexually transmitted diseases (STD).
- AIDS is caused by HIV.
- Gonorrhoea is caused by a bacterium (*Neisseria gonorrhoeae*). Syphilis is caused by a long, corkscrew bacterium (*Treponema pallidum*).



TERMINAL EXERCISES

1. What is a disease? How does it differ from disorder?
2. Name the two categories of acquired diseases.
3. Explain the term (i) parasitism (ii) reservoir.
4. Give two symptoms of coronary diseases and of typhoid.
5. What precautions should be taken to prevent malaria?
6. Name the pathogen that causes diphtheria and the one, that causes cholera.
7. Mention the four types of acquired diseases.
8. Differentiate between :
 - (i) Communicable and non-communicable diseases
 - (ii) Pathogen and vector
 - (iii) Syphilis and gonorrhoea
 - (iv) HIV and AIDS
 - (v) Benign and malignant tumours
9. How does polio virus enter human body? How does it paralyse limbs?
10. A nursing mother is given an immunization for BCG and DPT to the baby. What are the diseases against which she would be protected?
11. Give the cause, symptoms and treatment of haemorrhagic dengue fever.
12. Give full form of STD.
13. Mention any two symptoms of syphilis.
14. State the means by which we may prevent and cure gonorrhoea.
15. What does the term AIDS stand for?
16. Write four possible symptoms of AIDS.
17. Mention three general points which may control sexually transmitted diseases.



ANSWERS TO INTEXT QUESTIONS



Notes

- 29.1** 1. Any condition which interferes with the normal functioning of the body.
 2. (i) congenital (ii) degenerative
 3. Refer text.
 4. Presence of large number of organisms on the surface of body.
- 29.2** 1. Contact or scabs
 2. Appearance of rashes on the body
 3. Nervous system
 4. Rabies virus
 5. *Aedes aegypti*
- 29.3** 1. (i) *Mycobacterium tuberculosis*
 (ii) *Salmonella typhi*
 (iii) *Vibrio cholerae*
 2. Oozing semisolid material in the throat, form a membrane which blocks the air passage.
 3. Prolonged contact with patient.
- 29.4** 1. Female *Anopheles*
 2. *Entamoeba histolytica*
 3. Elephantiasis or Filariasis
- 29.5** 1. It is passed down from parents to offspring.
 2. The blood pressure remains persistently high.
 3. Benign tumor does not spread to other parts of the body, whereas malignant tumor cells spread to other parts of the body.
- 29.6** 1. Any three points mentioned under “mode of transmission”
 2. Give any two points written under “prevention and cure”.
 3. Human immunodeficiency virus.
 4. Mention any two points given under “symptoms.”
 5. (i) Partner-notification.
 (ii) Education of STD.
 (iii) Screening for STD.
- 29.7** 1. *Treponema pallidum*
 2. (i) Swelling of mucous membrane of urinogenital tract.
 (ii) Burning sensation during passing of urine.
 3. (i) Prostitution and homosexuality should be avoided.
 (ii) Certain medicines may check the diseases.

MODULE - V
EMERGING AREAS IN BIOLOGY

30 Biotechnology

31 Immunobiology: An Introduction

