IMMUNITY AND HUMAN DISEASES

1. IMMUNITY ::

Definition :

Immunity (L. Immunis = free), is a natural or acquired resistance of an individual to development of pathological condition even after having received infective dose of virulent pathogen, its or an allergen. "Immunity is the resistance of body to effect of certain pathogenic microorganism."

Immune System : Is a complex system of the body including cellular and molecular components which has the primary function of distinguishing self from nonself and defence against infections agents, foreign substances and cancer.

Immunology : (L. Immunis free, logos-study) is the branch of biology which deals with the study of immune system and immune responses. Study of structure and function of immue system is called immunology.

- **Edward Jenner** is known as father of immunology.
- **Antigen** - Foreign substance which initiates imume respouse.

Types of Immunity :

Immunity is of two basic types, innate and acquired.

(A) Innate Immunity :

- Innate immunity is also known as inborn immunity. It is present from birth.
- Innate immunity is the first line of defence in most organisms, whether plants or animals.
- The immunity remains throughout life.
- Contact with pathogen or its antigen is not essential.
- Innate immunity is inheritable.
- It protects the individual from contraction of diseases of other organisms.

(B) Acquired Immunity :

- Acquired immunity develops only on exposure to the concerned microorganism.
- It develops during life time.
- The acquired immunity can be short lived or life long.
- Contact with pathogen or its antigen is essential.
- Acquired immunity cannot be passed to the next generation.

2. COMPONENT OF IMMUNCE SYSTEM

Immune system has two components, humoral and cell mediated.

(A) Humoral Immune System :

- The antibodies are formed by B-Lymphocytes.
- These are specific for antigens.

(B) Cell Mediated Immune System :

- This system defends the body against pathogens including fungi and protists which enter the body. This system also reacts against tissue transplants and against body's own cells that have become cancerous.
- It is component of Immune system which consist of T-Lymphocytes.
- The system provides cellular Immunity. It functions against pathogen which pass into host cells, the Immune system also operates against cancer cells and transplants. It also activates B-Lymophocytes.

3. DISEASE ::

- Disease is defined as the malfunctioning of the organs of the human body.
- Sickness, illness, ailment as disease is a disorder that affects an organism.
- The term disease means DIS-EASE or without ease or discomfort.

3.1 Sources of Disease :

- Generally, factors affecting health may be divided into following groups -
  (a) Intrinsic factors and
  (b) Extrinsic factors

(A) Intrinsic or Internal Factors :

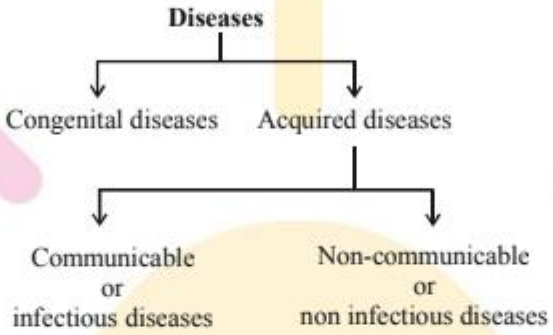
- The disease causing factors which exist with in the human body are called intrinsic factors.
- The important intrinsic factors which affect human health are the following -
  - Malfunctioning or improper functioning of various body parts.
  - Genetic disorders
  - Hormonal imbalances
  - Malfunctioning of immune system
- The diseases caused by intrinsic sources or factors are called **organic** or **metabolic** diseases.
- Some of the diseases caused by intrinsic sources are -
  - Cardiac failure
  - Kidney failure
  - Osteoporosis (Pore in bones)
  - Myopia or short sightedness
  - Sickle cell anaemia etc.

(B) Extrinsic or Internal Factor :

- The factors causing diseases and existing outside the human body are called extrinsic or external factors.
- The important extrinsic factors which upset human health are the following -
  - Unbalanced diet
  - Diseases causing micro-organism such as viruses, bacteria, fungi etc.
  - Environmental pollutants.
  - Tobacco, alcohol and narcotic drugs.

- Extrinsic factors affect the health of our body by interfering with normal fuctioning of the body system.
- Some of diseases caused by extrinsic factors are–
  - Kwashiorkor
  - Marasmus
  - Night blindness
  - Beri Beri etc.

Types of Diseases :



- Human diseases are broadly grouped into two categories -

(A) Congenital Diseases :

- These diseases are those which are present since birth.

(B) Acquired Diseases :

- These diseases are those which develop after birth.

(B) Acquired Diseases :

Acquired diseases can be broadly classified into two types -

- Communicable
- Non-communicable

- **Communicable or-Infectious Diseases -**

- These diseases are caused by some biological agents or pathogens.
- Pathogens such as Virus, Bacteria, Protozoans and Fungi.
- Those infectious diseases are communicated from diseases person to healthy person they are known as communicable diseases.
- Examples - Malaria, Influenza, Jaundice, AIDS etc.

- **Non-Communicable Diseases or Infectious Diseases :**

- These are not spread from infected person to healthy person.
- Non communicable diseases may be caused from deficiency diseases, degenerative diseases, cancer and metabolic disorders.
- Several non communicable diseases caused due to the deficiency of nutrients are called nutritional deficiency diseases or nutritional disorders.
- Examples - Marasmus and Kwashiorkor (deficiency of proteins) Rickets, Goiter, Beri-Beri etc.

4. DIFFERENT TYPES OF DISEASES CAUSED DUE TO INFECTION BY MICRO ORGANISMS ::

4.1 Diseases Caused by Protozoans :

(A) Malaria :

- **General Introduction -**

➤ Malaria is caused by a protozoan parasite *Plasmodium*. This disease spreads through the bite of an insect vector-the female *Anopheles* mosquito which feeds on human blood. (Male *Anopheles mosquito* feeds upon nectar. Thus does not spread malaria).

- **Symptoms -**

➤ Main symptom of malaria include headache, nausea, muscular pain and fever at regular intervals.

- **Prevention -** We can protect us from the bite of mosquitoes by following methods :

➤ Wire-gauze should be used on doors and windows of our houses to prevent entry of mosquitoes.

➤ Insect-repellents (e.g., Odomas) should be used to prevent mosquito-bite.

➤ Mosquito larvae should be killed by sprinkling kerosene oil on large-sized water bodies. Some larvivorous fishes such as *Gambusia, Minnows* or trouts or birds (e.g., ducks) can be introduced in water bodies.

➤ Adult mosquitoes can be killed by spraying insecticides (e.g., BHC, Malathion) on the walls of human dwellings.

- **Treatment -**

➤ A drug named Quinine, which is extracted from the bark of *Cinchona* tree, is used to treat a person suffering from malaria.

(B) Trypanosomiasis (Sleeping sickness) -

➤ **Cause -** Trypanosomiasis is caused by **Trypanosoma**.

- **Life Cycle of Trypanosoma -** Life cycle of *Trypanosoma* is digenetic.

➤ Primary host is Man (Dogs and pigs are also found with *Trypanosoma*)

➤ Secondary host is *Glossina* (Tse - Tse fly)

➤ **Glossina** is a blood sucking insect.

(C) Kala-azar :

➤ Kala azar is caused by *Leishmania donovani*.

➤ **L.donovani** is a parasite in human blood mainly found in blood capillaries of visceral organs.

➤ **Note :** The parasite mainly attacks the endothelial cells of blood vessel and lymphatics

➤ **Epidemiology** - Kala azar spread from infected person to healthy person through vector **sandfly** (Phlebotomus).

➤ Following are the symptoms of **Kala azar**.

(i) Fever

(ii) Enlargement of the spleen and liver

(iii) Rheumatic pain

- **Note :** *Leishmania tropica* causes oriental sore.

Types of Fever :

- Mainly of two types which are as follows :
  (I) Gambian fever
  (II) Rhodesian fever

❑ **Gambian Fever -**

- Gambian fever is also called west African sleeping sickness.
- Gambian fever is caused by- *Trypanosoma gambiense*
- Gambian fever spread by both sexes of Tse-Tse fly (*Glossina palpalis*)
- Gambian fever mainly occurs in west and central Africa

❑ **Rhodesian Fever -**

- Rhodesian fever is also called East Africans sleeping sickness.
- Rhodesian fever is caused by **T. rhodesiense**.
  R.fever spread by *Glossina moisitans*
- **Epidemiology -** From infected man to healthy man by Tse-Tse fly.
- **Symptoms** of trypanosomiasis varies according to presence of *Trypanosoma* in blood, lymph and cerebrospinal fluid.
- *Trypanosoma* in blood causes very high fever.
- *Trypanosoma* in lymph results in swelling of neck and armpit.
- *Trypanosoma* in cerebrospinal fluid causes, weakness mental dullness, severe headache, muscle spasm, fremor of hands, pain stiffness in neck, excessive drowsiness etc.
- Following are the **medicines** used in the treatment of trypanosomiasis.
  (i) Suramine (ii) Lomadine
  (iii) Bayer 205 (iv) Pentamidine

❑ **Note :** Yet no vaccine is available for trypanosomiasis.

4.2 Diseases Caused by Viruses :

❑ **General Introduction -**

- Influenza is commonly called flu.
- It is an international disease and is caused by influenza virus (*Myxovirus influenzae*).

❑ **Symptoms -**

- The common symptoms of influenza disease are sudden onset of chills, discharge from the nose, sneezing, fever, muscular pains and general weakness. Fever last three days in adults.

❑ **Prevention -**

- We should try to keep away from flue patients.

❑ **Control -**

- Ammantadine and Rimatidine are recommenede for the treatment of influenza.

(A) Jaundice/Hepatitis :

❑ **General Introduction -**

- Jaundice or hepatitis is the disease of liver.
- Jaundice is caused by viral infection.
- The types of hepatitis are : Hepatitis A, Hepatitis B, Hepatitis C, Hepatitis D, Hepatitis E or

Hepatitis G.

- Hepatitis is spread mostly by food and water contaminated with hepatitis virus.

Symptoms -

- High temperature, headache, fatigue, general weakness, and joint pains.
- Loss of appetite (called **anorexia**) with a feeling of nausea and vomiting.
- Appearance of irritating rashes on body.
- Dark yellow urine.
- Light coloured stool after 3 to 10 days of infection.

Prevention -

- Use chlorinated, boiled and ozonized water.
- Proper cleaning of hands after handling bed and vessels of the patient.

Control -

- Application of **interferon injection** on the advice of the doctor will control the diseases.
- For an early cure, it is essential that patient of jaundice should take adequate rest.

(B) Rabies/Hydrophobia :

General Introduction -

- The bite of a rabid dog (**mad dog**) and some other rabid mammals such as monkeys, cats or rabbits may cause rabies, which is fatal.
- Rabies is a viral disease caused by a rabies virus which is present in the saliva of the infected animals.

Symptoms -

- Rabies is characterized by severe headache, high fever, painful contraction of muscles of throat and chest (due to which there is difficulty in swallowing).
- The patient feels restless, does excessive salivation, has a chocking feeling and finds difficulty in taking in even liquid food.

Prevention -

- Wash the wound with carbolic soap and clean water immediately after the bite. Apply antiseptic medicine.
- Compulsory immunization of dogs and cats should be done. Pet dogs should be vaccinated with anti rabies vaccine.
- A rabid animal shows excessive salivation and tries to seek isolation after bite and so such an animal should be killed.
- Rabies can be treated by **"Pasteur's treatment"** (discovered by Louis Pasteur) in which a course of 14 vaccines was given.
- Currently five anti-rabies vaccines are prescribed at an interval of 0-3-7-14-30 days of dog bite.

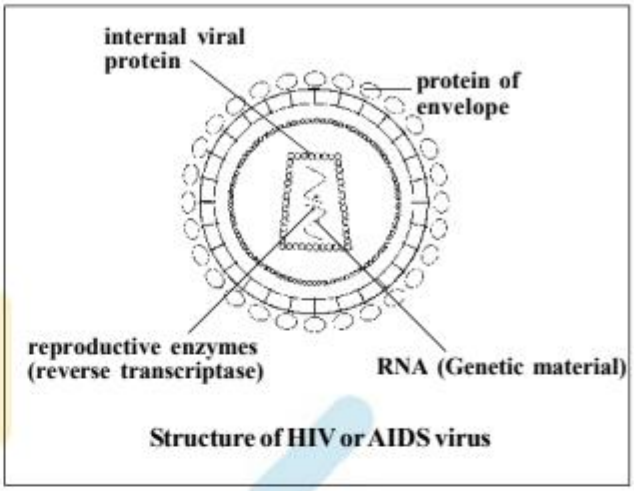
(C) AIDS (Acquired Immuno deficiency syndrome) :

General Introduction -

- AIDS stands for "Acquired Immuno Deficiency Syndrome" (It is a fatal disease). The disease of AIDS is caused by retrovirus (a RNA virus) known as Human Immunodeficiency virus (HIV).
- AIDS virus attacks white blood cells, (WBCs) or lymphocytes (T_4 helper cells) of human beings

and weakens the human body's immunity or self-defence mechanism.

❑ **Transmission -**



Structure of HIV or AIDS virus

- The AIDS disease usually spreads through unprotected sexual contact with an infected person carrying AIDS virus. Thus, AIDS is a sexually transmitted viral disease.
- The AIDS disease also spreads through the transfusion of blood contaminated with AIDS virus.
- The AIDS disease also spreads through the use of infected needles for injections (i.e., sharing of infected injection needles which have not been sterilized).
- An AIDS infected mother can transmit the virus to her child during pregnancy or during birth (i.e., by mother's blood).

❑ **Symptoms -**

- Swollen lymph nodes.
- Decreased count of blood platelets causing haemorrhage and fever.
- Sweating at night and weight loss.
- Severe damage to brain which may lead to loss of memory, ability to speak and even think.

❑ **Prevention -**

- The common razor at the barbers shop should not be used.
- A blood donor should be first tested HIV negative.
- Disposable needles and syringes should be used.
- Sexual contact with unknown people should be avoided.

❑ **Control -**

Till date there is no effective treatment for AIDS. Indinavir drug is used.

(D) Poliomyelitis (Polio) :

- Poliomyelitis has been found throughout the world since ancient times and occurs only in humans.
- The polio virus (with single stranded RNA) belong to picornavirus group and is one of the smallest known (10mμ is in diameter) virus.
- Polio virus enters the body through food and water, multiplies in the cells of the intestinal wall and the infection spread to the lymphatic System and blood stream.
- On reaching the CNS, the virus destroys the dorsal horn cells of the spinal cord which control the activities of the muscles.
- Without nerve impulse the muscles fail to work and Shrink in children, so commonly called "Infantile paralysis".

❑ **Control :**

- Oral vaccines are available (developed by **Jonas Salk** and **Albert Sabin**, 1940) to Protect babies from polio attack.

- Public pulse polio Immunization programe is organized in India for eradicating polio.

4.3 Diseases Caused by Bacteria :

(i) Tuberculosis (T.B.)

(ii) Cholera (iii) Typhoid

(iv) Diarrhoea (v) Anthrax

(i) Tuberculosis :

❑ General Introduction -

- Tuberculosis was first discovered by German scientist **Robert Koch** in 1882.
- T.B. is an infectious disease which is communicated from one person to another directly or indirectly.
- Tuberculosis is caused by bacterium called *Mycobacterium tuberculosis*.
- The bacterium releases a toxin called **tuberculin**.
- T.B. can affect all parts of body such as lungs, lymph glands, bones, intestine, etc.

❑ Symptoms -

- The patient of tuberculosis feels sick and weak.
- There is a loss of appetite and weight.
- There are following two specific sites of tuberculosis infection.

❑ Prevention -

- Immunization with BCG (Bacillus-Calamite-Guerin) vaccination is the best way to prevent from tuberculosis.
- Patient should be kept in properly ventilated room.

❑ Control :

- The tuberculosis can be cured by the following six essential drugs.
  1. Rifampicin (RMP), 2. INH, 3. Streptomycin, 4. Pyrazinamide, 5. Ethambutol and
  6. Thiacetazone.
- Thus, T.B can be controlled by the use of antitubercular therapy (ATT).

(ii) Cholera :

❑ General Introduction -

- Cholera is an acute infectious disease caused by a bacterium *Vibrio cholera*.
- It is caused due to neglection in personal hygiene and sanitation. It is common during the days of floods.
- Flies, contaminated water and contaminated food are the main transmitting agents of cholera.

❑ Symptoms -

- Frequent vomiting with feeling of nausea.
- Painless watery diarrhoea.
- Diarrhoea, results in dehydration, weight loss and cramps in the muscles.
- Patient's eyes becomes sunken.

❑ Prevention -

- Persons should be immunized by standard cholera vaccine.
- Only boiled water and well-cooked food should be used in areas which are chloroprene.

- ORS (**Oral Rehydration Solution**) should be used immediately
- Careful personal hygiene should be maintained.

❑ **Control -**

- ORS should be fed to the patient immediately.
- Effective antibiotics under the proper medical supervision should be used.

(iii)Typhoid :

❑ **General Introduction -**

- Typhoid is most common infectious or communicable disease of India.
- Typhoid is caused by a rod-shaped and motile bacterium, called *Salmonella typhi*.
- Infection takes place by the oral route through ingestion of food, milk or water contaminated by contact with faecal matter of the typhoid patient.
- The bacteria spread through faecal matter by house flies.

❑ **Symptoms -**

- Headache and typhoid fever which rises maximum in the afternoon. The temperature increases each day in the first week.
- High fever in the second week. Fever gradually decline during 3rd and 4th day.

❑ **Prevention -**

- Proper sanitation and disposal of faecal matter prevents infection.
- TAB-vaccination provides immunity for 3 years.
- Typhoral oral vaccine also prevents typhoid.

(iv) Diarrhoea :

❑ **General Introduction -**

- Diarrhoea is an abnormally frequent discharge of semisolid or fluid faeces.
- There may be blood and mucus in the stools.
- Persistent vomiting and loose stools cause dehydration and shock.
- Blood pressure may fall, pulse rate increases and temperature rise.
- The causative agents of diarrhoea are mainly bacteria such as. *E. coli, Clostridium botulinum, Salmonella* etc.

❑ **Symptoms -**

- Patients become irritable due to frequent loose motions and vomiting.
- Sunken eyes with a pinched nose.
- Tongue appears to be dry.
- Sudden weight loss with weak pulse rate.
- Little or no urine; urine starts becoming dark yellow.

❑ **Prevention -**

- Boil water before drinking. This kills bacteria and other organisms responsible for causing diarrhoea.
- Protect eatables from dirt, flies and cockroaches, etc., by covering them.
- Wash all vegetables and fruits properly before use.
- Use clean air-tight containers for the storage of food.

- During diarrhoea, infants should be breast-fed, if possible.

❑ **Control :**

- Oral Rehydration Solution (ORS) should be given continuously to prevent dehydration.
- Consult a qualified doctor at the earliest to start anti-microbial and anti-diarrhoeal drugs.
- Give complete bed rest to the patient.
- Use *isbagol* husk with water or curd.

(v) Anthrax :

❑ **General Introduction :**

- Anthrax is a bacterial disease affecting several wild and domestic animals, e.g. cattle sheep, goat, etc.
- It can also infect human beings when exposed to infected animals and is caused by the bacterium *Bacillus anthracis*.

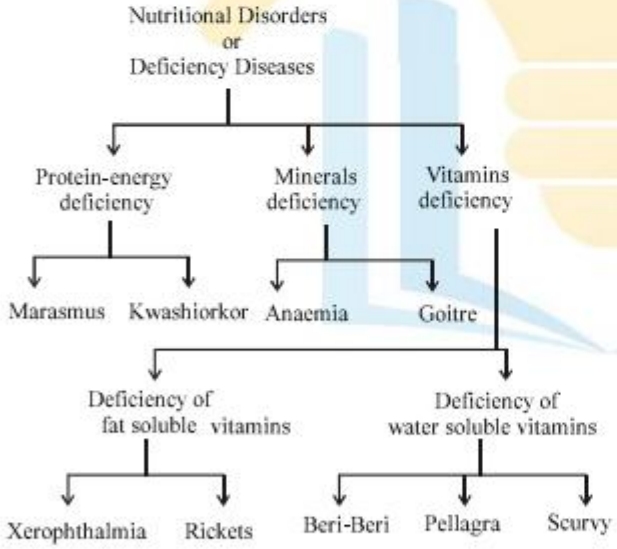
❑ **Symptoms and forms of anthrax :**

- **Cutaneous :** It is not a common infection, however, if not treated timely and properly, it man result; into death.
- **Inhalation :** Anthrax may also be caused due to inhalation. Initial symptoms are similar to that of common cold.
- **Intestinal** : Symptoms of this form of anthrax are excessive pain, loss of appetite, nausea, vomiting and ultimately blood vomiting.

❑ **Prevention :** A complete course of anthrax vaccination which includes four subcutaneous injections should be taken.

❑ **Control :** Proper antibiotic, as per the advise of a qualified doctor, should be taken.

5. NUTRITIONAL DISORDERS OR DEFICIENCY DISEASES ::



- A disease which is caused due to lack of a nutrient such as carbohydrates, fats, proteins, minerals or vitamins in our diet is called a deficiency disease.
- In other words it can be said that a disease which arises due to the lack of adequate and balanced food is called a deficiency disease, Deficiency diseases are also called **nutritional disorders.**
- The deficiency diseases are of following three types –

- Protein-Energy deficiency diseases or Protein-Energy Malnutrition (PEM);
- Vitamin deficiency;
- Mineral deficiency.

5.1 Protein-Energy deficiency diseases

5.2 Vitamin deficiency diseases

5.3 Mineral deficiency diseases

5.1 Protein-Energy Deficiency Diseases :

- Deficiency of proteins, carbohydrates and fats result's in **protein-energy malnutrition (PEM)**.
- PEM occurs more frequently among infants and young children between 1 to 5 year of age.
- Two common forms of PEM are Kwashiorkor and Marasmus.

(A) Kwashiorkor :

❑ General Introduction :

- Kwashiorkor is the common protein deficiency disease of children.
- Kwashiorkor is an African word from Ghana which means 'neglected child'.

Fig. Kwashiorkor

❑ Symptoms -

- Swollen abdomen with cracked and scaly skin.
- Limbs become thin.
- Oedema and Diarrhoea.
- Retardation in brain and mental development.

❑ Prevention -

- Sufficient amount of protein-rich diet should be given.
- A diet with a combination of wheat, gram, peanuts, soybean and jaggery gives satisfactory results to cure Kwashiorkor.

(B) Marasmus :

❑ General Introduction :

- Like Kwashiorkor, Marasmus is also a disease affecting children below the age of five.
- It is caused due to protein-energy malnutrition which develops in infants during the first few months.

Fig. Marasmus

❑ **Symptoms :**

➢ Wasting of muscles observed.

➢ Ribs becomes prominent.

➢ Dry, thin and wrinkled skin is observed.

➢ Diarrhoea is a very common symptom.

❑ **Prevention :**

➢ A protein-rich diet should be given.

➢ Besides this, the diet should also contain sufficient amount of carbohydrates and fats.

➢ In case of unavailability of mother's milk, the child should be given pure and undiluted cow's milk.

❑ **Control :**

➢ Babies should be breast-fed as long as possible.

5.2 Vitamins Deficiency Diseases :

➢ Vitamins are organic compounds which are always taken along with food in small amounts.

➢ Absence of these in diet for prolonged periods may cause deficiency diseases.

➢ Diseases caused by the deficiency of vitamins are Scurvy, Rickets, Beri Beri, Pellagra and Xerophthalmia.

➢ On the vitamins solubility vitamins deficiency diseases are two types –

(A) Deficiency of Fat Soluble Vitamins :

(B) Deficiency of Water Soluble Vitamins :

(A) Diseases Caused by Deficiency of Soluble Vitamins A & D -

(I) Xerophthalmia (II) Rickets

(I) Xerophthalmia or Night Blindness :

❑ **General Introduction -**

➢ Xerophthalmia is caused by the deficiency of a fat-soluble vitamin, called **vitamin A** or **retinol**.

➢ Retinol is a fat-soluble vitamin and is required to maintain general health and vigour of epithelial cells of our eyes, skin and hair and thus, contributes to general growth our body.

❑ **Symptoms :**

➢ Retarded growth, atrophy, keratinization, in the epithelial cells.

➢ Dry and scaly skin (dermatosis).

➢ Shortage of vitamin A disables a person from seeing in dim light or in dark, a condition called **Nyctalopia** or **Night blindness**.

➢ Eye disease due to retinal deficiency, called **keratomalacia**.

❑ **Prevention/Control :**

➢ Carrot and milk are the two best available sources of vitamin A, and are thus highly useful for the improvement of vision and in curing night blindness.

➢ Other good sources of vitamin A are green leafy vegetables, pumpkin, mango, fish liver oil and liver.

(II) Rickets :

❑ **General Introduction -**

- Deficiency of **vitamin D** or **Calciferol** in the diet causes increased loss of Ca^{2+} in urine therefore, no calcium ion (Ca^{2+}) gets deposited in the bone.
- Disease of bones called rickets in children and **Osteomalacia** in adults.

Fig. Rickets (bow leg)

❑ **Symptoms -**

- Bones of children suffering from rickets become thin, soft and weak due to poor deposition of calcium and phosphorus in them.
- The signs of rickets in children are **bow legs** (bent legs) due to deformation in long bones (leg bones).

❑ **Prevention/Control :**

- Vitamin D prevents rickets by helping the body to absorb calcium.
- Human skin contains a large amount of a compound called **7-dehydrocholesterol**. When ultraviolet rays of sunlight falls on our skin, then this compound is converted into vitamin- D. In our country the new born babies are exposed to sunlight every day. This is done to produce vitamin D which will prevent rickets.

(B) Diseases Caused by Deficiency of Water Soluble Vitamins B and C :

(I) Beri-beri

(II) Pellagra or 4D-Syndrome

(III) Scurvy

(I) Beri-beri :

❑ **General Introduction -**

- Beri-beri was first observed amongst Japanese seamen who generally fed with a diet of polished rice.
- It was then investigate that the polished or dehusked rice is deficient in vitamin B.
- Beriberi occurs mainly in areas where polished rice is the staple diet of the people.
- Polished rice since it causes a deficiency of vitamin B_1 or Thiamine in our body.

❑ **Symptoms -**

- Waterlogging of the tissues resulting in severe pain in legs, and oedema.
- Extreme weakness, headache and dizziness.
- Loss of appetite is also occur.
- Paralysis of some body parts may also occur.

❑ **Prevention/Control :**

- A-diet rich in vitamin B_1 should be taken.
- The food items rich in vitamin B_1 include grain cereals, beans, groundnuts, green vegetables, soybean, milk and seafood.

(II) Pellagra or 4D-Syndrome :

❑ **General Introduction -**

- The deficiency of **vitamin B4** or **niacin** (= **nicotinic acid**) in the diet causes a disease called pellagra.
- Pellagra is an Italian word which means rough skin.

❑ **Symptoms -**

➢ Pellagra disease is characterized by four D's (called 4D syndrome). i.e. four grouped of symptoms are-

(i) Dermatitis (ii) Diarrhoea

(iii) Dementia (iv) Death

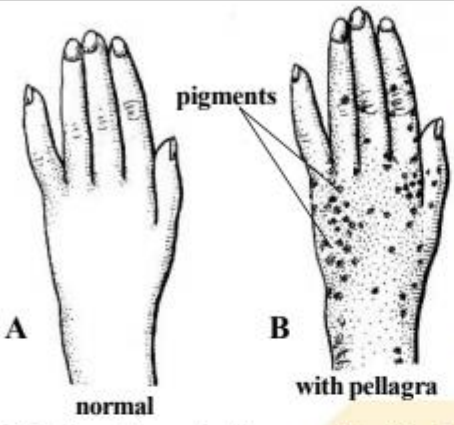


Fig. Symptoms of pellagra on the skin of hands of a patient.

➢ Dermatitis means inflammation of the skin and it is characterized by skin eczema.

➢ Diarrnoea means loose motion which is due to disturbances of digestive tract.

➢ Dementia means psychological disturbances or mental degeneration and its symptoms include depression, irritability and delirium.

❑ **Prevention/Control -**

➢ Diet supplemented with following plant sources viz., cereal husk, peas, beans, green leafy vegetables, coffee and animal sources viz., liver, fish, milk, egg yolk will either prevent or control the disease.

(III) Scurvy :

❑ **General Introduction :**

➢ Deficiency of vitamin-C in the diet causes a deficiency disease, called scurvy.

➢ Vitamin C deficient persons usually include the homeless, alcoholic, lonely house bound women and bottle fed babies.

➢ Vitamin C promotes collagen (= protein) synthesis and collagen is a main component of connective tissues which are present in the walls of blood vessels.

❑ **Symptoms :**

➢ Swelling and bleeding of gums.

➢ Loosening of the teeth, which eventually may fall out.

➢ Pain in the joints.

➢ General weakness and fatigue.

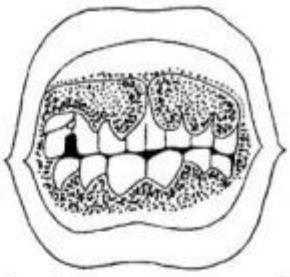


Fig. Swollen, spongy gums and loose teeth as a result of chronic vitamin C deeficiency.

❑ **Prevention/Control :**

➢ Scurvy can be cured by giving vitamin C-rich diet.

➢ All citrus fruits, e.g. lime, lemon, oranges, amla, etc., are a good source of vitamin C.

➢ Vitamin C is destroyed by heating and, therefore, uncooked vegetables are very rich in vitamin C.

5.3 Minerals Deficiency Diseases :

➢ Deficiency or lack of various minerals in the human diet gives rise to different diseases.

➢ Some of the mineral deficiency diseases are : Anaemia, Goitre.

(I) Anaemia :

❑ **General Introduction :**

➢ This is the disease caused by deficiency of iron, which is required to form the protein–Haemoglobin present in red blood cells in our body.

➢ Anaemic patients, percentage haemoglobin (Hb) will be low in blood.

➢ The main function of Hb is to transport O_2 from lungs to various parts of the body.

❑ **Symptoms :**

A person suffering from anaemia, becomes pale, loses appetite and feels tired.

❑ **Prevention/Control :**

➢ Liver, eggs, molasses, cereal, pulses, leafy vegetables, egg plant, apple, banana, guava are rich in iron.

➢ Disease can be prevented or can be controlled, by including iron containing vegetables and fruits in the daily diet.

(II) Goitre :

❑ **General Introduction -**

➢ Goitre is an **endemic disease** which is caused due to deficiency of a mineral, called **iodine** in human diet.

➢ Iodine is an important constituent of a hormones called thyroxin which is secreted by an endocrine gland called thyroid gland.

❑ **Symptoms -**

➢ Retarded growth.

➢ Mental disability.

➢ Abnormal enlargement of the thyroid gland (called goitre).

➢ In children, deficiency of iodine results in a disease called **cretinism** or **infantile myxedema.**

Fig. Goitre

- Deficiency of dietary iodine in adults leads to a disease is called goitre.

❑ **Prevention/Control -**

- Sea food, leafy vegetables, water, iodized salt, etc. are rich in iodine, diet supplemented with them will restore normal function of thyroid.
- Besides, intra muscular injection of iodized oil (mostly poppy-seed oil) or oral sodium iodate tablet developed by ICMR has been found to be effective against goitre.
- Efforts of ICMR are also on to develop common salt fortified with iron and iodine, i.e. "**two-in-one**' salt to check the disease.

6. VACCINATION :

- The first true vaccine consisting of weakened micro organisms against chicken cholera was developed in 1880 by the french Scientist **Louis Posteur.**
- Vaccine is a preparation of killed, inactivated or attenuated (weakend) microorganism or toxoids induce immunity.
- The vaccination is a process of conferring immunity by administering a vaccine.
- Vaccination is a technique to develop immunity without infection. Weakend (attenuated) or dead pathogens, or portion of pathogens, are injected into a person who is required to be made immune. The pathogens given in a vaccine are unable to cause the disease, but are sufficient to stimulate the formation of antibodies by the host's immune system that recognize the antigens. Thus, a vaccinated person develops immunity against the pathogen without contracting the disease.
- Todays, vaccines are available against small pox, cholera, measles, mumps, polio & rabies.
- Often 2 or 3 additional doses needed to generate adequate immunity.
- There are called booster doses.
- Small pox was the first disease to be eliminated by vaccination.
- It is also the first disease to be officially declared wiped out by human efforts.

EXERCISE - 1

A. VERY SHORT ANSWER TYPES QUESTIONS

Q.1 Name the pathogen of Cholera.

Q.2 Name the causal organism of AIDS.

Q.3 Name two diseases caused by bacteria.

Q.4 What is Immunity.

Q.5 What is the cause of rabbies ?

Q.6 Name the disease the child will not suffer from if BCG vaccine is given.

Q.7 What is the full form of PEM.

Q.8 Deficiency of which Vitamin causes Xerophthalmia.

B. SHORT ANSWER TYPES QUESTIONS
(About 30–40 words)

Q.9 What are the cause (i.e., causative organisms) of the following diseases :
(i) Flu (ii) Hepatitis
(iii) Rabies (iv) T.B.

Q.10 What are congenital diseases.

Q.11 What are the symptoms of Influenza.

Q.12 Name the disease caused by Vitamin C deficiency. What are the sources of this Vitamin ?

Q.13 Name the source of Vitamin A.

Q.14 What is the symptoms of typhoid.

C. LONG ANSWER TYPES QUESTIONS
(More than 60–70 words)

Q.15 Describe types of immunity.

Q.16 What is communicable and non-communicable diseases. Give example of each.

Q.17 What do you understand about Intrinsic or Extrinsic factors of disease.

Q.18 What is rickets ? how can it be prevented ?

Q.19 What is beri-beri, mention its symptoms and how can it be prevented.

Q.20 Give an account of malaria, giving its cause, vector, symptoms and control measures.

Q.21 Give two minerals deficiency diseases.

D. FILL IN THE BLANKS

Q.22 Deficiency of riboflavin results in .....

Q.23 Anaemia is caused by the deficiency of .....

Q.24 Deficiency of vitamins D in adults causes .....

Q.25 Deficiency of thiamin leads to a disease called .....

Q.26 Deficiency of iron in the food leads to .....

E. TRUE OR FALSE

Q.27 Children need not be immunized.

Q.28 Tuberculosis was first discovered by Robert koch.

Q.29 Congenital diseases are present since birth.

Q.30 Anthrax is a bacterial disease.

Q.31 AIDS spreads by handshake with infected person.

Q.32 Vitamin C is obtained in excess from milk.

Q.33 Rickets is a PEM disease.

Q.34 Beri-beri disease occurs due to deficiency of thiamine in diet.

Q.35 Deficiency of calcium, phosphorus and vitamin D in diet of a child leads to osteomalacia.

Q.36 We should always eat polished rice to stay healthy.

F. SINGLE CHOICE QUESTIONS

Q.37 Jaundice is disease of -
(A) Kidney (B) Liver
(C) Pancreas (D) Duodenum

Q.38 Immuno–deficiency syndrome could develop due to -
(A) Defective liver
(B) Defective thymus
(C) AIDS Virus
(D) Weak immune system.

Q.39 Lack of Iodine causes -
(A) Goitre (B) Fluorosis
(C) Anaenia (D) Osteomalacia

Q.40 AIDS virus cannot be transmitted to another person by -
(A) Blood transfusion (B) Shaking hands
(C) Sexual contact (D) Infected needles

Q.41 T.B. is cured by -
(A) Steptomycin (B) Ubiquinone
(C) Griseofulvin (D) Encitol

Q.42 Which of the following is a bacterial diseases -
(A) Sickle-cell anaemia (B) Cholera (C) Cancer
(D) Goitre

Q.43 Among the following a communicable disease is -
(A) Diabetes (B) Diphtheria
(C) Hypertension (D) Kwashiorkor.

Q.44 One stands the risk of dehydration in -
(A) Jaundice (B) Pneumonia
(C) Malaria (D) Diarrhoea

Q.45 BCG-vaccine is used for preventing -
(A) Cholera (B) Tuberculosis
(C) Measles (D) Tetanus

Q.46 Which of the following is not a sexually transmitted disease -
(A) Tuberculosis (B) Syphilis

(C) Gonorrhoea (D) AIDS

G. MATCH THE COLUMNS

Q.47

Column - I	**Column - II**
1. Pellagra	a. Thiamin
2. Rickets	b. Retinol
3. Xerophthalmia	c. Cyanocobalamine
4. Pernicious anaemia	d. Calciferol
5. Beri-beri	e. Niacin
	f. Ascorbic acid

H. FILL THE BOX WITH APPROPRIATE WORD

Q.48 Other name of rabies - ☐

Q.49 AIDS virus attack - ☐

Q.50 Vitamin-C deficiency causes - ☐

Q.51 Iodine deficiency causes - ☐

I. ASSERTION-REASON TYPE QUESTIONS

The following questions consist of two statement each : assertion (A) and reason (R). To answer these questions, mark the correct alternative as described below :

(a) If both **A** and **R** are true and **R** is the correct explanation of **A**.

(b) If both **A** and **R** are true but **R** is not correct explanation of **A**.

(c) If **A** is false but **R** is true.

(d) If both **A** and **R** are false.

Q.52 **A :** Iodine is an important component of diet.
R : Deficiency of iodine causes Goitre.

Q.53 **A :** Deficiency of vitamin B_1 causes Beri-beri
R : Whole wheat bread and dalia are the richest source of vitamin B_1.

Q.54 **A :** Vitamin C is called ascorbic acid.
R : Cod liver oil is a rich source of vitamin C.

Q.55 **A :** Anthrax is caused due to vibrio cholerae.
R : Symptoms of anthrax includes loose motion vomiting leading to dehydration.

Q.56 **A :** Communicable diseases can spread by means of air, water, food & physical contact.
R : Malaria is an example of communicable diseases.

EXERCISE - 2

A. SINGLE CHOICE QUESTIONS

Q.1 The opposite to innate Immunity is -
(A) Phagocytosis
(B) Passive immunity
(C) Acquired immunity
(D) None of these.

Q.2 Humoral-immune system comprises -
(A) B lymphocytes (B) Blood
(C) T Lymphocyte (D) Monocytes.

Q.3 The study of resistance to disease is called -
(A) Pathology (B) Ccytology
(C) Immunology (D) None of these.

Q.4 Oral vaccine prevents the attack of -
(A) Typhoid (B) Polio
(C) Tetanus (D) Cholera

Q.5 Causative agent of T.B. is -
(A) *Salmonella* (B) *Mycobacterium*
(C) *Streptococcus* (D) *Pneumococcus*

Q.6 Which of the following is a bacterial disease-
(A) Poliomyelitis (B) Filariasis
(C) Tetanus (D) Malaria

Q.7 Typhoid is caused by -
(A) *Escherichia* (B) *Giardia*
(C) *Salmonella* (D) *Shigella*

Q.8 Which of the following pairs is characterized by swollen lips, thick pigmented skin of hands and legs and irritability -
(A) Thiamine deficiencies - Beri-beri
(B) Protein deficiency - Kwashiorkor
(C) Nictoinamide deficiency - Pellagra
(D) Iodine deficiency - Goitre

Q.9 Blood capillaries can easily rupture due to the deficiency of -

(A) Vitamin A (B) Vitamin C

(C) Vitamin D (D) Vitamin K

Q.10 Which one is correct statement -

(A) Sunshine vitamin is vitamin C

(B) Antixerophthalmic and undisturbed vitamins are B and C

(C) Prolonged deficiency of nicotinic acid produces pellagra

(D) Vitamins A, D, E, K are water soluble

B. MULTIPLE CHOICE QUESTIONS

Q.11 Which one of the diseases is not communicable

(A) Typhoid (B) Cancer

(C) Measles (D) Leukemia

Q.12 AIDS is mainly caused by -

(A) Sexual intercourse

(B) Bacteria

(C) Through placental transfusion (D) Protozoa

Q.13 Which is insoluble in water -

(A) Retinol (B) Thiamine

(C) Calciferol (D) Ascorbic acid

Q.14 Which of the following is water soluble -

(A) Vitamin A (B) Vitamin B

(C) Vitamin D (D) Vitamin C

Q.15 Anaemia is caused due to deficiency of -

(A) Sodium

(B) Iron

(C) Calcium

(D) Cyanocobalamin

C. PASSAGE BASED QUESTIONS

PASSAGE 1 (Q.16 TO Q. 19)

AIDS stands for "Acquired Immuno Deficiency Syndrome" (It is a fatal disease). The disease of AIDS is caused by a pathogen. Causal organism of AIDS attacks white blood cells, (WBCs) of human beings and *weakens the human body's immunity or self-defence mechanism*.

The AIDS disease usually spreads through several means including unprotected, sexual contact.The

disease can also spreads through the transfusion of blood contaminated with AIDS virus.

Q.16 The disease of AIDS is caused by -
(A) Bacteria (B) Virus
(C) Fungi (D) None of these

Q.17 AIDS virus attacks on -
(A) Red blood cells (R.B.Cs)
(B) T_4 helper cells
(C) Both
(D) None of these.

Q.18 Immuno-deficiency syndrome could develop due to -
(A) HLA (B) HCG
(C) HIV (D) MHC

Q.19 AIDS spread by -
(A) Homosexuality
(B) Immoral way of life
(C) Infected needles and syringes
(D) All the above

ANSWER

EXERCISE -1

A. VERY SHORT ANSWER TYPES QUESTIONS

1. Vibro–chloera

2. HIV (Human Immuno–deficiency Virus).

3. Cholera, Tuberculosis (T.B.).

4. The resistance of the body to the effect of certain pathgenic micro organism.

5. Bite by a rabid dog.

6. Tuberculosis (TB).

7. Protein-energy malnutrition.

8. Vitamin A

D. FILL IN THE BLANKS

22. Cheilosis **23.** Iron

24. Osteomalacia **25.** Beri-beri

26. Microcytic anaemia

E. TRUE OR FALSE

27. False **28.** True **29.** True **30.** True

31. False **32.** False **33.** False **34.** True

35. False **36.** False

F. SINGLE CHOICE QUESTIONS

37. B **38.** C **39.** A **40.** B

41. A **42.** B **43.** B **44.** D

45. B **46.** A

G. MATCH THE COLUMNS

47. 1-e, 2-d, 3-c, 4-b, 5-a,

H. FILL THE BOX WITH APPROPRIATE WORD

48. Hydrophobia **49.** T_4 helper cell

50. Rickets, Beri-beri **51.** Goiter, Anaemia

I. ASSERTION-REASON TYPE QUESTIONS

52. A **53.** B **54.** C

55. D **56.** A

EXERCISE -2

A. SINGLE CHOICE QUESTIONS

1. C **2.** A **3.** C
4. B **5.** B **6.** C
7. C **8.** C **9.** B
10. C

B. MULTIPLE CHOICE QUESTIONS

11. B, D **12.** A, C **13.** A, C
14. B, D **15.** B, D

C. PASSAGE BASED QUESTIONS

PASSAGE 1 (Q.16 TO Q. 19)

16. B **17.** B **18.** C **19.** D