Human Health and Common Human Diseases (Understanding Diseases and Immune System)

Disease is a condition of disturbed or deranged functioning of the body caused by infection, defective diet, heredity, environment or deprived condition of brain. Health is a state of complete physical, mental and social well being.

TYPES OF DISEASE

1. Congential disease
   Diseases contracted before birth due to defective heredity (chromosomal abnormalities and gene mutations), physiological disturbance or transplacemental transmission, e.g. haemophilia colour blindness, sickle cell anaemia, Down's syndrome, klinefelter's syndrome.
2. Acquired disease
   Diseases contracted after birth due to infection, defective diet, hypersensitivity, injury, addiction, degeneration, cancer, depression etc. Acquired diseases are broadly differentiated into two types, communicable or infectious and non-communicable or non-infectious. Communicable diseases are of several type like deficiency disease, degenerative or organic disease, allergies, mechanical psychological, cancer, metabolic disorders, physical disorder.
3. Infectious disease (communicable disease)
   They are diseases due to pathogens that can be transferred from one individual to another e.g. Viral, bacterial, protozoans, fungal, helmintic other organisms, sexually transmitted etc.
4. Deficiency disease
   Disease caused by absence or deficiency of an essential element e.g. anemia, goiters, kwashiorkor, beri-beri
5. Degenerative disease
   Diseases caused by ageing resulting in malfunctioning or decreased efficiency e.g. hypertension, atherosclerosis
6. Allergies
7. Mental disorders
8. Occupational disease
9. Addiction
1. 10.Cancer and AIDS

CAUSES OF DISEASE / DISEASE AGENTS

Disease agent is an organism, substances force or disturbance which causes disease due to excessive presence, deficiency or absence

1. Pathogens / Biological agents
   They are biological entities which causes infectious disease. Example virus (mumps, chicken

pox, small pox), mycoplasma (acute leukemia, bronchitis), Chlamydia (trachoma) rickettsia (typhus, trench fever), bacteria (cholera, tetanus), spirochaetes (syphilis) ,fungi (ringworm, thrush, moniliasis, pulmonary aspergillosis), protozoa (giardiasis, sleeping sickness), helminths (filariasis, ascariasis, taeniasis), other organisms (scabies)

2. Nutrient agents
   Deficiency of vitamins (beri-beri, scurvy, night blindness), minerals (anemia, rickets), carbohydrates, fats and protein (maramus, kwashiorkor) or excess of food (obesity)
3. Chemical agents
   (i) Endogenous: Excess presence of urea and uric acid, reduced secretion of ADH (diabetes insipidus) or insulin (diabetes mellitus)
   (ii) Exogenous : Pollutants(pneumoconiosis) allergens (allergy)
4. Physical agents
   Heat (e.g. stroke), cold (frost bite), radiations, sound (impaired hearing ,electricity, pressure, humidity etc.
5. Mechanical Agents
   Fractures, sprains, dislocations, injury, chronic friction
6. Genetic agents
   Excess or deficiency of chromosomes, mutations harmful alleles e.g. colour blindness, albinism. Haemophilia, Turner's syndrome
7. Degeneration
   They include old age change like peptic ulcers, hypertension, atherosclerosis
8. Social and personal inconsistencies: They lead to mental disorder.

INFECTION

Infection is invasion, establishment and growth of pathogens in a host contamination is occurrence of harmful organism or their products in articles of use. E.g. milk, food, water, garments. Infestation is occurrence of animal parasites or ectoparasites like lice on or inside the body of an individual.

KOCH'S POSTULATES

Robert Koch studied diseases and pathogens of anthrax (Bacillus anthracis) in 1876, tuberculosis (mycobacterium tuberculosis) in 18982 and cholera (vibrio choleras) in 1883. He gave forth germ theory of disease and proposed four criteria for establishing an agent of infectious disease. They are called Koch's postulates

1. Pathogenic organism occurs in abundance in patients suffering from diseases.
2. Pathogen can be separated and cultured.
3. Healthy persons injected and cultured pathogen contracts disease.
4. Pathogenic organism is recoverable from the newly diseased individual.
   However, viruses cannot be grown in pure artificial cultures.

RESERVOIR OF INFECTION

It is the place or organism where a pathogen resides without causing any infection e.g. air, soil, water, animals (reservoir hosts) and some human beings called carrier. Carrier is an animal or healthy human host which harbor the pathogen without being harmed and passes the same to another susceptible individual. Many cook passed typhoid to several thousand individuals. She has been appropriately called typhoid Mary.

TRANSMITION OF INFECTIOUS DISEASE

1. Direct Transmission
   An intermediate agent is absent
   - i) Direct contact with infected persons. The diseases are called contagious e.g. ringworm, syphilis
   - ii) Droplet Infection: Transmission is from an infected person to healthy person in mist emitted from nose, lungs and mouth while sneezing, splitting, talking and coughing. E.g. influenza, common cold and diphtheria.
   - iii) Contact with soil: Soil born pathogens enter the host through injured or exposed part. E.g tetanus
   - iv) Animal bite: Rabies is spread through bite of dog / cat
   - v) Transplacemental Transmission: Mother transfer virus of German measles and bacterium of syphilis through placenta.
2. Indirect Transmission:
   An intermediate agent is required
   - i) Vectors : Vectors are living agent for transferring pathogens e.g. housefly, mosquito, tse-tse fly, sandfly. Mosquitoes are vectors of malaria, encephalities, filarial, yellow fever, dengue etc. Housefly is vector of cholera, dysentery, typhoid, diarrhea, conjunctivitis.
   - ii) Vehicle born: An article of food, water ice carries the pathogen for transmission e.g. cholera, typhoid, dysentery.
   - iii) Air borne: Dust and air current spreads disease.
   - iv) Tomite borne: Articles handled or coming in contact with patients are cause of disease transmission, e.g. door handles, taps, crockery, currency, garments.
   - v) Unclean hands: They transfer germs to healthy person, food, utensils etc.

RESISTANCE TO INFECTION

Every pathogen has a specific portal of entry into the body. Invasiveness of a pathogen is its ability to gain entry into host and grow. Virulence is the ability of pathogen to produce disease. Toxigenicity is power of a pathogen to form toxins capable of damaging host cells. Degree of virulence depends upon

invasiveness and toxigencity. Infective dose is the maximum number of pathogenic organism that can result in the production of disease. Infection depends upon the presence of infective dose, virulence of pathogen, natural resistance and immunity. Host has three line of defense against invasion by pathogens. They are nonspecific and specific defense mechanism

VIRAL DISEASES

VIRAL HEPATITIS

- Viral hepatitis is commonly called jaundice viral hepatitis is common in Eastern Europe, Africa and Asia. In early stage the liver is enlarged and congested. In later stage the liver becomes small, yellowish or green
- The symptoms in early phase includes-fever, anorexia, nausea, vomiting, epigasric discomfort pains in muscles and joints
- The urine is dark and stool is pale. Leukopenia is followed by lymphocytosis. Splenic enlargement is sometimes present. Jaundice increases for 1-2 weeks
- There are six varieties of hepatitis. These are Hepatitis A, known as infectious hepatitis is a benign. Usually it is not fatal but in rare case its fatal rate is 0.1%. It is spread by ingestion of contaminated water and food
- Hepatitis B, called as serum hepatitis is versatile one. Blood and body secretions such as saliva, sweat, semen, tears, breast milk are vehicle of transmission
- Hepatitis C has been known to cause 90 to 95% of cases of transfusion associated hepatitis.
- Hepatitis D, called delta hepatitis. HDV is defective virus for which NBV is the helper. Thus, hepatitis D develops when there is concomitant hepatitis B infection
- Hepatitis E, is an enterically transmitted and is water born infection. A characteristic feature of hepatitis E infection is the high mortality rate among pregnant women
- Hepatitis G is caused by hepatitis GB virus

Preventive measures
The control measures for infectious hepatitis are

- Sanitary disposal of excreta
- Prevention of contamination of water, food and milk
- Control of flies
- Screening of kitchens and latrines
- Personal cleanliness and also that of food handlers
- During epidemic,, boiled or chlorinated water should be taken
- To control semen hepatitis, person having hepatitis should not be accepted as blood donors pregnant women having serum hepatitis can transmit the disease to infants.

DENGUE FEVER

- Dengue fever is caused by an RNA containing arbo virus of feavi virus group which also causes yellow fever. Thus, the virus which causes dengue fever is a mosquito born flavi-ribo virus

- The virus of dengue fever is transmitted by the bite of tiger mosquito, Ades aegypti during day time. Aedes aegypti is primarily a day time feeder and mainly bites in the morning or late in the afternoon in covered areas. The Aedes aegypti female prefers to lay its eggs in artificial, rather than natural containers, that have fairly clean water and are located around human habitation
- Incubation period is 3-8 days Classical dengue fever
- It is an acute viral infection caused by at least 4 stereotypes of dengue virus. The reservoir of infection is both man and mosquito. The transmission cycle is man-mosquito-man. Aedes agypti is the main vector. The illness is characterized by an incubation period of 3 to 10 days

Symptoms

(i) Abrupt onset of high fever
(ii) Several frontal headache
(iii) Pain behind the eyes which worsens with eye movement
(iv) Muscle and joint pains
(v) Loss of sense of taste and appetite
(vi) Measeles like rash over chest and upper limbs
(vii) Nausea and vomiting

Dengue haemorrhagic fever

- Dengue haemorrhagic fever (DHF) is a severe form of dengue fever, caused by infection with more than one dengue virus. The severe illness is thought to be due to double infection with dengue viruses – the first infection probably sensitizes the patient, which the second appear to produce an immunological catastrophe

Symptoms

(i) Bleeding from the nose, mouth, gums and skin bruising
(ii) Sever and continuous stomach pains
(iii) Frequent vomiting with or without blood
(iv) Pale cold or clammy skin
(v) Excessive thirst (dry mouth)
(vi) Rapid weak pulse
(vii) Difficulty in breathing
(viii) Restlessness and constant crying

Prevention

- No vaccine for dengue fever is available. Eliminate mosquito breeding places by covering small water containers, water tanks, changing the water of cooler every week and where Aedes mosquito breed. Wear cloths which cover arms and legs. Use mosquito repellents, repellent cream and sleep in mosquito – net

YELLOW FEVER

- Yellow fever is a zoonotic disease caused by an arbovirus. It is a haemorrhagic disease transmitted by an infected Aedes aegypti. It affects principally monkeys and other vertebrates in tropical America and Africa.
- Yellow fever is characterized by headache, fever, vomiting, rupture of veins in kidney, spleen, liver, etc. In severe cases, the skin of the sufferer becomes yellow from jaundice, hence the name yellow fever
- Max Theilder in 1951 got Nobel Prize for the development of vaccine for yellow fever

CHIKUNGUNYA

- It is a temporarily debilitating disease caused by Alpha virus and spread through mosquitoes, Aedes aqypti and Aedes albopictus
  Symptoms
- The patient has maculopapular (strain and eruptions) rash of limbs and trunk and arthritis of multiple joints
- There is fever which lasts for about two days which is accompanied by conjunctivitis and photophobia. Even after disappearance of fever, headache, insomnia and arthritis continue for 5-7 days

Treatment

- Chloroquine phosphate has been found to reduce the impact of the disease. Prophylaxis Protection against Aedes mosquitoes by use of long sleeves, full pants, socks, windows and doors with wire gauze screens and mosquito repellents are preventive measures. There should be no stagnant water nearby

COMMON COLD

- Common cold is caused by 100 types of Rhino virus and small bacterium Dialister pneumosintes

Symptoms

- Virus infects nose and upper respiratory passage causing inflammation of mucous membranes
- There is irritation of nasal tract, nasal congestion, flow of mucus, sneezing, sore throat, hoarseness, cough, tiredness, head ache and slight fever Treatment : It cures automatically after 3-7 days

MUMPS

- Mumps is caused by Parmyxovirus (RNA virus) or myxovirus parotiditis. Virus generally affects the children between the age of 5 and 12 years
- It is highly infectious and spreads through droplet infection or direct contact with the mucus membranes of mouth.
- Incubation period is about 12-26 days

Symptoms

- Mumps causes inflammation of the parotid glands behind ears. It also affects testes and ovaries in adults leading to sterility.

Treatment

- One attack gives a lifelong immunity
- There is no specific medicine for mumps
- MMR vaccine is used against measles, mumps and German measles (rubella)

MEASLES (Rubeola disease)

- Measles is highly infectious childhood disease occurring between 3-6 years of age
- It is caused by Rubeola virus which is passed out in the secretions of nose and throat of the infected person as droplets or in articles soiled by these secretions. The incubation period is of 10days

Symptoms

- Eruptions of small spots in the form of rash all over on face and body along with itching
- Inflammation of respiratory passage from mouth to bronchi, sometimes may effect conjunctiva

Treatment

- Single attack gives a lifelong immunity
- Edmonston B vaccination is also available to provide active immunity
- Antibiotics and sulpha drugs are effective in measles

CHICKEN POX

- Chicken pox is caused by Varicella zoster virus a DNA virus, which is passed out in the discharges of the respiratory tract of the infected person directly as droplets or through contaminated articles used by the patient.
- Incubation period is of 14-21 days

Symptoms

- Dew-drop like rash (pox) at stomach and chest, spreading later on face and the whole body characterize it. Also high fever, itching, aches and uneasiness occurs

Treatment

- Boric acid, calamine and benzyl benzoate reduces itching and tendency to scratch.
- One attack give a lifelong immunity
- No vaccine available so far

SMALL POX

- It is an eruptive viral disease which has been completely eradicated through widespread compulsory vaccination. The last case was reported in Somalia in 1977.
- WHO declared the planet free from small pox in 1980. The disease is caused by brick shaped DNA virus called Variola Virus
- Infection starts from oral, nasal, vesicular discharges, pustules and scabs. Incubation period is 12 days

Symptoms

- The disease begins with headache, backache, chill, high fever, rashes appearing on third day of illness as reddish spots which change in to papules and finally scabs in third week
- The spots appear first on the hair line, then face and over rest of the body but fewer on the trunk. The scab fall down leaving permanent pox mark, complications include blindness
- Death could occur

Treatment

- Vaccine for small pox was developed by Edward Jenner and gives active immunity

TRACHOMA

- Trachoma is caused by chlamydia trachomatis.
- It is spread through direct contact with the discharge from infected eyes.
- It causes ulceration of cornea and conjunctiva of the eye.
- In acute case it lead to blindness.

Symptoms

- It is caused by development of granules.
- There is inflammation pain and watering of the eye.

Treatment

Sulpha drug and specific antibiotics help to cure the disease

POLIMYELITIES

- Poliomyelities is caused by enterovirus, polio virus (RNA virus) who is 10µm in diameter
- It enters the body through food and water and multiplies in the ells of the intestinal wall and spreads in nervous system through blood
- Incubation period is 7-14 days

Symptoms

- It produces inflammation of the nervous system
- There is inability of bending the head forward stiffness of neck, paralysis of skeletal muscles, fever, headache, chilliness and pain all over the body

Treatment

- Oral polio drops on 6th , 10th and 14th week of the child.
- Booster shots before the age of 3 and 4 years give immunity
- A person who recovers from polio has a life time immunity
- Vaccine for polio are killed Salk's vaccine and live Sabin's oral vaccine

INFLUENZA (FLU)

- Orthomyxo virus, a spherical RNA virus having a lipid envelope causes influenza
- Influenza is epidemic, endemic and pandemic
- Endemic influenza is caused by Haemophilus, influenza, a gram (-)ve bacteria
- Avian flu is a viral disease caused by H5N1 virus, first reported in China
- Incubation period is 18 hours to 72 hours

Symptoms

It is characterized by discharge from the nose, sneezing, sore through, cough, muscle pain, headache, chill and fever fro 4-5 days.

Treatment

Vaccination is available but a high risk

RABIES (Hydrophobia)

- Rabies is primarily a disease of carnivores like dogs, cats etc. It is caused by Rabies Virus (Rhabo virus or Lyssa Virus)
- It enters human body with saliva of an infected animal generally by bite or scratch of dog or a cat
- The virus destroys the brain and spinal cord

Symptoms

- It is characterized by scare of water in victim and biting behaviors. Other symptoms are anxiety, irritability, fatigue, loss of appetite, sensitivity to light and sound, saliva from the mouth, headache, fever and inability to swallow fluids due to chocking throat

Treatment

Treatment of rabies was discovered by Louis Pasture. It involves a series of 14 injections given after the bite of dog. It is antirabies serum. July 6 is marked as world Rabies Day

BACTERIAL DISEASES

TUBERCULOSIS OR T.B.

- T.B. is caused by mycobacterium tuberculosis and infects any part of the body. It could be bones, brain or lunges and lymph nodes. Lung T.B. is most common. The bacterium releases a toxin tuberculin which destroy tissues it infects
- It spreads through sneezing, coughing, contaminated food water or cloths
- Incubation period is 3 to 6 weeks or may be years

Symptoms

- Constant cough and in severe cases sputum wille blood, pain in chest. While coughing, loss of body weight and gradual weakening of the body, low grade fever throughout the day are the symptoms of lungs T.B.

Treatment

- Sputum, tuberculin, X-rays and gastric analysis are carried out to diagnose tuberculosis
- Direct observation treatment (DOT) is a programme under WHO for treatment of T.B. across the world
- Some of the antituberculosis drugs are streptomycin, rifampicin, isoniazid, thiatozone, PAS (Paraamino salicylic acid) etc.
- BCG (Bacillus Clamette Guerin) vaccine for T.B. was obtained from bovine bacillus by Calmette and Guerin in 1921

DIPHTHERIA

- It is an acute infectious disease produced by gram (+) rod-shaped bacterium corynebacterium diphtheria
- Diphtheria has three forms-gravis, intermedius and mitis. Infection occurs mostly in children of 2-5 years
- It is spread through droplets method by kissing, coughing, sneezing and contaminated articles
- Incubation period is 2-5 days
- Portal of entry is upper respiratory tract through implantation may occur anywhere.
- Exotoxin produced by pathogen causes epithelial necrosis of nose (nasal diphtheria), throat tonsils (pharyngeal diphtheria) and laryngotrachea (laryngotracheal diphtheria)

Symptoms

- Fever, sore throat, epithelial necrosis by endotoxin and oozing of semi-solid material in the throat which develops into a grey false but tough membrane

- The membrane chocks the air passage sometimes, bacterium infects the heart leading to fatal heart blockage

Treatment

- Schick test the presence of antitoxin and the sate of hypersensitivity to diphtheria toxin
- Diphtheria antitoxin can neutralize the toxins produced only if given within 24 hours of appearance of symptoms.
- DPT- vaccine: Diptheria, pertussis and tetanus vaccine is given as immunization within six weeks of birth.

WHOOPING COUGH OR PERTUSIS

- Whooping cough is caused by Gram (-) non motile coccus Bordetella pertussis is a common childhood disease affecting the respiratory system
- It spreads by droplet infection or by direct contact.
- It has an incubation period of 1-16 days

Symptoms

- It causes constant cough leaving the child breathless, tired and red in face
- Later the voice becomes hoarse and the cough gives a whoop or loud crowing sound while inhaling
- The child usually vomits and there is frothy discharge from his mouth and nose

Treatment

- Immunization of disease is done by DPT vaccination within six weeks of birth. Three doses at one month interval at the age of 3 to 4 month

CHOLERA

- Cholera is water borne disease
- This is caused by the bacterium vibrio cholerae or comma infecting intestines and digestive tract
- It is spread through contaminated food and drinks
- The causative bacterium secretes cholera toxin enterotoxin which induces excessive secretion of an isotonic electrolyte solution by the intestinal mucosa
- Incubation period varies from a few hours to 2-3 days

Symptoms

- Cholera is mainly characterized by sudden onset of profuse, effortless, ricewater like stools, vomiting and rapid dehydration, loss of minerals and muscular cramps

Treatment

- Fluid and slat lost is restored by Oral Rehydration Solution (ORS). It is water with a small amount of sugar and salt
- Cholera vaccine is effective for six months only Prophylaxis
- Proper sanitation and hygienic conditions are the best methods of prevention

DIARRHOEAL DISEASES

- Diarrhoeal diseases are a group of diseases caused by different bacteria e.g. E.coli, shigella, campylobacter, salmonella, clostridium.
- This is spread through food poisoning, contaminated food, water or drinks, clothes, utensils and bed sheets.
- Incubation period is variable. Symptoms
- This is characterized by mild diarrhea. i.e loose stools if infected by E.Coli, frequent stool with blood and mucus and abdominal cramps if infected by shigella, dehydration, diminished appetite, fever, lower B.P., increase in pulse rate, etc

Treatment

- ORS is given repeatedly to check dehydration and loss of minerals. Prophylaxis
- Proper sanitation and hygiene are needed for prevention

LEPROSY (HANSEN'S DISEASE)

- Mycobaterium leprac causes this dreaded disease.
- Presence of lepronain in skin test, can indicate the appearance of leprosy. It spreads through contact with infected person
- Its incubation period is up to five years
- It is of two types

(i) Tuberculoid leprosy involving tuberculoid granuloses formed by aggregation of macrophages

(ii) Lepromatous leprosy characterized by modular aggregates of lipis laden macrophages, lepra cells.

- Lepromatous leprosy gives positive test with lepromin while lepromatous leprosy is negative lepromin test.

Symptoms

- It is characterized by the chronic infection of skin and other tissues including nerves and wasting of body parts, formation of ulcers, nodules, scales, deformities of fingers, toes making the infected parts senseless or numb and hypopigmentation of skin

Treatment

- Surgery along with drugs diaminodiphenyl sulphone or dapsone, ofloxacin, chaulmoogra oil can cure the disease

TEATNUS (LOCK JAW)

- It is an incurable bacterial disease (Clostridium tetani) characterized by painful muscular contraction of jaw. The incidence its occurrence is quite common in India with high mortality in infants and mothers
- The bacterium occurs in intestine of horse and other animals from where they pass out as spores in their excreta that mixes in street dust and contaminates various articles including rusted iron. Wounds and cuts, surgical instruments coming in contact with road dust may caused the entry of spores into body
- The bacteria are released inside the body. They multiply and begins to secrete a toxin named tetanospasmin
- Incubation period is 3-28 days.

Symptoms

- Disease is caused by tetanospasmin reaching the CNS. It begins with headache, chill irritability followed by back pain, stiff neck and spasm of jaw, ultimately there is lock jaw, spasm of chest, abdomen and spine leading to death due heart failure suffocation and exhaustion

TYPHOID

- Salmonella typhi, a rod like bacterium causes this contagious disease of intestines.
- The organisms of the disease are present in stools and urine, therefore, carried by contaminated water and food
- Incubation period of the bacterium is 1-3 weeks

Symptoms

- This disease is characterized by the inflammation of ileum and colon, liver and spleen also becomes enlarged, abdominal pain, constant fever, extreme weakness, vomiting, rash of rose coloured spots called rose spot on the upper abdomen and sore throat.

Treatment

- Typhoid is diagnosed by Widal test.
- Typhoid vaccines (TAB vaccine) provide immunity for about three years
- Antibiotic like ampicillin and chlor amphenicol.
- Resistant cases are treated with quinoline derivative e.g. ofloxacin, ciproflaxacin.
- Surgical removal of gall bladder (cholecystectomy) is carried out on the carriers in order to remove source of infection because the bacterium remain concentrated in gall bladder in carriers.

PNEUMONIA

- Pneumonia is a serious disease of lungs characterized by accumulation of mucus / fluid in alveoli and bronchioles to that extent the breathing becomes difficult
- It is caused by strepto coccus pneumonia or Diplococcus pneumoniae, have an incubation period of 1-3 days.
- It is spread through sputum of the patient.
- It is of two types
  - i) Bronchopenumonia in young children and elderly persons
  - ii) Lobarpneumonia in 10 -15 year old

Symptoms

- The onset of pneumonia is usually sudden with a single shaking chill, followed by fever pain with breathing on the side of lung involved, increased pulse and respiratory rates and cough. Sputum is bloody or rusty

Treatment

- Drugs against pneumonia are tetracycline, erythromycin and sulphonamide. If untreated pneumonia leads to death

PLAGUE (BLACK DEATH)

- Plague is caused by a rod shaped non-motile bacterium called Pasteurella / Yersinea pestis trismitted by the bite of infected rat flea Xenopsylla cheopis. This disease kills the rats. Rat flea leave the dead rats and attack humans. The death of rats is an indication of outbreak of plague
- It is of three types

i) Bubonic plague (black death) having an incubation period of 2-6 days. Pathogen multiplies in lymph nodes, especially armpit and groin which swell up into painful buboes. Other symptoms are high fever, chill, delirium, exhaustion and haemorrhages which turn black. The patient dies there after. Hence, plague is also called black death

ii) Septicemic plague – In this, buboes do not occur. It is characterised by sepsis, sever headache, rapid pulse, fever, chill, nausea, vomiting and rapid pulse, fever, chill, nausea, vomiting and delirium leading to death within two days

iii) Peneumatic or Pneumonic plague – It infects lungs causing pulmonary edema, fever, anoxia, delirium and death within twenty four hours.

Treatment and prevention

- Streptomycin or oral tetracycline is effective against plaque. Anti-plague vaccine, spray of insecticides, killing of rats, nose caps and high cots are some preventive measure

PROTOZOAN DISEASES

AMOEBIASIS OR AMOEBIC DYSENTERY

- Amoebiasis disease is protozoan infection of upper part of large intestine which is caused by monogenic protozoan known as Entamoeba histolytica
- The infection is by the cysts of Entamoeba present in the stool of infected person, cat, dog, monkey, rat, rabbit etc. through the agency of house flies, manure, air currents, number of other physical contacts and unsafe drinking water.
- Inside the intestine, the cyst germinates and releases 4-8 entamolbae. The parasites secrete an enzyme called cytolysin that partially dissolves the wall of large intestine
- The parasites reach blood capillaries and feed on red blood corpuscles.
- When the infection is sever, the parasites pass into blood stream and enter various body organs. The most commonly affected organs are liver, lungs, spleen and brain. These organs comes to have pus filled absecesses
- The feeding stage of a parasite is called trophozite or magna form (30µ). It stops feeding per-cystive stage is called minuta form (7-20µ).

Symptoms

- Amoebiasis disease is characterized by abdominal pain, mild diarrhea alternating with constipation, passing out of mucus, pieces of necrotic mucous membrane and blood in faeces, and faeces with cysts and charcot –Leydon white crystals.

Treatment

- This can be cured by administering drugs like, emetine, stremetine, carbosome, metronidazole and tinidazole.
  Prophylaxis
  - Disease can be prevented by proper sanitation with proper kitchen, protection of food from flies, proper washing of vegetables, heath education etc.

MALARIA

- Malaria is caused by a digenetic (have two hosts to complete its life cycle) and triphasic (having three phases of life cycle) protozoan parasites known as plasmodium
- There are four species of Plasmodium which causes four main types of malaria in human they are:

i) Plasmodium vivax – Benign tertian malaria in which fever recurs after every 48 hours
ii) P. malarie – Ouartan malaria in which fever appears after 72 hours and often produces persistent subclinical malaria
iii) P. falciparum – Cerebral malaria or malignant tertian malaria where fever recurs in every 48 hours

- The parasite has two hosts:

(i) Primary host or definitive host – female Anopheles mosquito
(ii) Secondary or intermediate host – man

- The infective stage of parasite in human begins is sporozoite

- The incubation period of Plasmodium ovale and P.Vivaz is 10-15 days, 6-12 days for Plamodic falciparum and 28-30 days for P.malariae
- Sporozoites are introduced in human being by the bite of female anopheles mosquito and then the sporozoites undergo multiplication in different stages
  - pre-erythrocytic schizogony, exoerythrocytic schizogony, erythrocytic schizogony and post – erythrocytic schizogony. Only erythrocytic schizogony occurs in case of P.falciparum
  - Erythrocytic schizogony occurs inside red blood corpuscles or erythrocytes, It occurs in repeated cycles. Infected red blood corpuscles are destroyed and melanin or haemozoin particles are released. They are toxic and cause rigor. The parasites present in red blood corpuscles ultimately form gametocytes. The ganetocytes are sucked by female Anopheles. Inside the mosquito the fertilization and development takes place to form sporozoites.

Symptoms

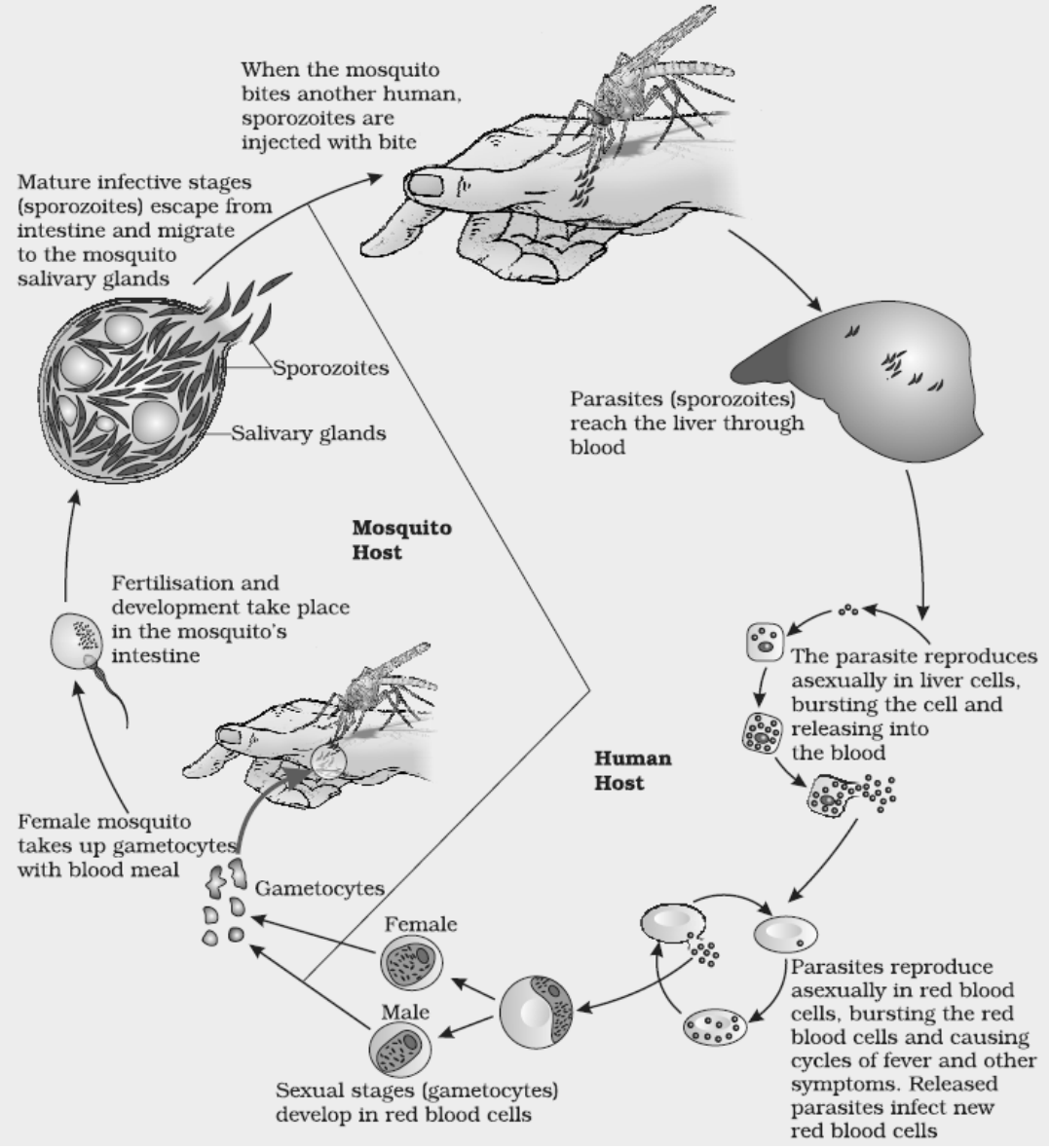
- Malaria is characterized by fever at intervals, sudden acute chillaess (cold or rigor state) accompanied by shivering followed by rise in temperature. Peak fever is 41.1^{O}C or 106^{o}F which persists for 3-6 hours. After 2-4 hours of fever there is profuse sweating which lowers the body temperature to near normal.
- Malaria is also accompanied by nausea headache, laziness and muscular pain. It also results in anemia and splenomegaly.
- Clinical fever in malaria is due to erythrocytic schizogony

Treatment

- Drugs like chloroquine and primaquine are administered to treat malaria. Other drugs like quinine obtained from the bark of cinchona plant, Camaquine, daraprix and artemesenin obtained from Artemesia annua.

Prophylaxis

- Fitting doors and windows with wire nets, using mosquito nets while sleeping, applying mosquito repellents and night, taking smaller prophylactic dose of ant malarial drugs at weekly intervals during malarial season can prevent effectively from infection of malaria
- Spreading areas with DDT, BHC and other insecticides. Introducing utricularia, ducks and larva eating fishes call Gambusia, stickle back and trout in larger water reservoirs for blocking the respiration of the larvae, covering all drains, introducing larvicidal Bacillus sphaericus, blue green algae like Aulosira and Anabaena in water bodies can help to protect against the breeding of mosquitoes
- National Malaria Eradication [Control] Programme was launched by the Ministry of Heath of the Government of India with the assistance of World Health Organization 9 WHO) in 1962 and almost controlled it by destroying the mosquitoes with DDT and other insecticide



AFRICAN SLEEPING SICKNESS OR TRYPANOSOMIASIS

- African sleeping sickness is of two types:
  - (i) Gambian (W. African) sleeping sickness caused by Trypanosoma gambiense by the bite of the blood sucking tse-tse fly. Glossina palpalis.
  - (ii) Rhodesian (E. African) sleeping sickness caused by Trypansoma rhodesiense by the bite of tse-tse fly.
- Trypansoma is a protozoan which is digenetic laving two hosts
  - (i) Primary host man
  - (ii) Antelope as reservoir host
  - (iii) Secondary host tse-tse fly Glossina palpalis

- The parasite lives in the blood stream and in the lymph, it invades the cerebrospinal fluid of the CNS causing fever, anemia, lethargy and death
- Chaga' disease (American sleeping Sickness) is caused by Trypanosoma cruzi spread by the bite of blood sucking bug Triatoma Sp.

Mode of infection

- The infection is initiated by the bite of tse-tse fly which harbours the infective metacyclic forms in the lumen of its salivary glands
- Then the parasite undergoes multiplication extracellular on sucked up to tsetse fly along with the blood meal
- In human beings, the parasite live in the blood plasma
- Later the parasite enters cerebrospinal fluid and damages the brain

Symptoms

- This disease is characterized by swelling of lymphatic glands, irregular recurrent fever followed by weakness, loss of weight, anemia, increase in pulse rate and severe headache
- In due course the patient fall asleep, first at regular intervals and then lies prostate in coma. Ultimately lead to death

Treatment

- Trypanosomiasis can be treated in early stages by the drugs suramin sodium, atoxyl, tryparsamide, germanin etc. But it is very hard to control it once the parasites have entered the cerebrospinal fluid. Orsamine is fairly effective treatment when the CNS is involved

Prophylaxis

- Prevention depends on the eradication of tse-tse fly by insecticides like DDT

KALA – AZAR OR DUMDUM FEVER OR VISCERAL LEISHMANIASIS

- Kala – azar known as Black fever or Dumdum fever is a serious oriental disease of man. This disease is caused by the protozoan Leishmania donovani through the bite of the sand fly Phlebotomus.
- Primary host –man
  Secondary host –sand fly
  Reservoir host – dog
- In man , L. donovani lives as an intercellular parasite in leucocytes or cells of liver, spleen bone marrow, lymphatic glands etc.
- Incubation period is long from 3 to 4 months and symptoms may appear even after 2 years

Symptoms

- Early symptoms of kala-azar include swelling, high fever and enlargement of spleen and liver, followed by general weakness, emaciation, anemia due to reduction in number of blood cells and a peculiar darkening of skin
- In advanced stage hair becomes brittle and falls out. The body immune system becomes so weak that secondary infection by bacteria or viruses lead to death

Treatment

- Pentavalent antimony compound like sodium antimony tartrate and glyconate urea stibamine, aminostiburea, neostibosan etc. are used for treatment of kala-azar

Prophylaxis

- Eradication of the insect vector sandfly by insecticides, eliminating the reservoir host and avoiding the bite of sandfly ate prophylactic measures against kala-azar
- Other Leshmanial diseases of man
- oriental sores – Leishmania tropica
- Naso –pharyngeal leishmaniasis – Leishmania.
- South – America kala azar – Leishmania chagasi

CILIARY DYSENTERY (BALANTIDIASIS)

- Ciliary dysentery is caused by ciliated protozoan named Balantidium coli. The protozoan inhabits the human large intestine and reproduces there asexually by transverse binary fission and sexually by conjugation. This is followed by cyst formation and cysts pass out in the hosts faeces
- Infection occurs by ingesting cysts in food and drinks

Symptoms

- The protozoan causes ulcers in the colon and invades hyaluronidase. This generally results in vomiting abdominal pain, weight loss diarrhoea

Treatment

Tetracycline and iodoquinol are effective treatments against the disease Prophylaxis

- Protection of food articles from dust and flies that may carry cysts in the best prevention from infection

GIARDIASIS

- Giardiasis, is a protozoan disease caused by Giardia intestinalis. It inhabits upper part of small intestine (duodenum and jejunum)
- It is the first human parasitic protozoan known

- It does not infect the intestinal wall but increases its number in the lumen and interferes with food absorption. A large number of cysts are formed which are released with faeces
- Infection is by contamination of food and drink with cyst

Symptoms

- Characterized by epigatric pain, abdominal discomfort, headache and mild diarrhea involving passage of pale, bulky, foul smelling and greasy stool Prophylaxis
- Clean water supply, infection free food, proper washing hands, fruits and vegetables before eating etc.

FUNGAL DISEASES [DERMATOPHYTOUS]

- They are ringworm or round red or silvery type of superficial fungal infections of skin caused by species of Trichophyton, microsporeum and Epidermophyton. There are dry scaly lesions on skin, nails and scalp that causes intense itching. Heat and moisture promotes growth of these fungi especially in skin folds. Common source of infection are soil and towels, cloths, combs etc of infected persons
    (i) Trichophyton rubrum : Dermatophytoses of foot (like foot ringworm, athlete's foot, tinea pedis), onychomycosis (fungal infection of nails), ringworm of groin (tinea cruris, dhobi itch, jockey itch)
    (ii) T. mentagrophytes: Oxeychomycosis, ringworm of body (tinea corporis, tinea circinata), ringworm of beard (tinea barbac or barber's itch.
    (iii) T. tonsurans, T. violaceum, Microsporum andoninii Ringworm of scalp (tinea capitis)
    (iv) Microsporum canis : Cats and dogs and from there to children – tinea capitis, tinea corporis
    (v) Epidermophyton floccosum, E. cruris, Tinea cruris, tinea pedis, tinea manum, tinea corporis, oxychomycosis

HELMINTHIC DISEASES

ASCARISIS

- Common ascariasis is caused by the common round worm Ascaris lumbricoides. It is a giant intestinal worm, white in colour and female longer than in male. Females lay about 200,000 eggs daily that pass out with human faeces and remain alive in soil for several days
- There is no intermediate host of the parasite so man acquired infection by directly ingesting Ascaris eggs, containing the infective stage rhabditoid larvae, with contaminated food or water

Symptoms

- Since a large number of adult Ascaris worm normally infect a single host, they obstruct the intestinal passage and thereby cause abdominal discomfort like colic pains. The patient may also suffer from impaired digestion, diarrhea and vomiting.

- They sometimes bore the intestinal epithelium and lead to some vital organs like kidneys spinal cord, brain or muscles causing injuries to the organs.
- They cause pneumonia with fatal consequences, with inflammation of alveolar tissue followed by oedema. The infection is followed by anaemia, leukocytosis and cosinophilia. Worms produces toxins which cause irritation of mucous membranes, nervous system like convulsions, nervousness, etc.

Treatment

- Infection of Ascaris can be treated with dose of hexylresorcinol crystals in a gelation capsule after about 12 hours of fasting. Some antihelminths drug like oil of chenopodium tetrachlorethylene, piperazine, hetrazan etc are also followed effecting against worms.

Prophylaxis

- Soil pollution with faecal matters should be prevented.
- Vegetable and fruit should be thoroughly washed.
- Finger nails should be cut regularly as eggs can accumulate below them.
- Children are more prone so abstaining children from sanitary habits.

FILARIASIS OR ELECPHANTIASIS

- The disease is due to nemantode Wuchereia bancrofti. Another species is Brugia malayi. This disease spread by then are respectively called bancroftian filariasis and brugian filariasis
- The pathogen is spread from one human being to another through mosquitoes like Culex and to a less extent by Amopheles and Aedes
- The parasite resides in lymph vessels, connective tissues and mesentery
- The parasite is viviparous. The young ones are called microfilariae . They are hardly 2.5 cm long
- Microfilariae enter the blood vessels and reach the skin area during night for being picked by female mosquito for completion of life history and change into infective stages
- The infective parasites are deposited near the site of mosquito bite. They pass through the punctured skin and reach the lymphatic system

Symptoms

i) In the first stage, the patient has increased cosinophils, enlarged lymph nodes and positive intradermal parasite test

ii) Second or carrier stage is symptomless but right blood examination can reveal the parasite

iii) Third stage is characterized by filarial fever, inflammation of lymph nodes and lymph vessel

iv) The final stage is manifested by thickening of subcutaneous tissues and skin so that there is permanent swelling mostly feet, legs, thighs, scrotal sac, breast etc. it is called elephantiasis

Treatment

- The disease can be cured by drugs like hetrazan, MSE and diethyl carbamazine (DEC)
- Reconstruction of affected body parts through surgery
- The disease can be prevented by prevented by taking precautions against mosquito bites

CANCER

- Cancer is a group of diseases characterized by uncontrolled proliferation of cells and ability of proliferated cells to invade other tissues / parts body. It is more common in old persons after 40 days and in tissues where cells undergo divisions regularly
- Neoplasm is a new abnormal tissue that is capable of continued growth, formation of tumour, crowding and disrupting of normal cells. Tumours grow or swelling are caused by abnormal proliferation of cells
- They are of two types, benign and malignant. Benign tumour is a large localized mass of abnormal tissue which pressures other tissues and cause pain but does not infiltrate adjacent tissue because it is encapsulated in connective tissue, malignant tumour is a large mass of abnormal tissue which is not encapsulated, is capable of invading adjacent tissue and distant sites
- Metastasis is spread of cancerous cells from one part of the body to other parts through blood, lymph or formation of secondaries from a malignant tumour
- Cancers are of three types

(i) Carcinoma : It is cancer of epithelial / epidermal tissue and their derivatives like skin, mucous membrane, glands, lungs, breast, pancreas, stomach etc

(ii) Sarcoma : It is the cancer of primitive mesodermal tissue like connective tissue, bones, muscles, lymph nodes, etc. Depending upon the tissue involved, sarcoma is of several types e.g. lymphoma (involving lymph vessels), lipoma (adipose tissue) osteoma (bone), malignant reticulosis etc

(iii) Leukemia : It is malignancy where there is unwanted and uncontrolled increase in number of white blood corpuscles (200,000 – 1000,000 mm3) and immature or myeloid stem cells. In common type of Leukemia, the white blood corpuscles infiltrate bone marrow, spleen, liver, lymph nodes and other organs causing damage and increasing their size. In myelcytic leukemia (9th and 22nd chromosomes bring their jumping genes together) erythroblastic tissue of bone marrow degenerates. There is bleeding at different places. Tonsils and cervical glands enlarge. The most common cancers in India are mouth throat cancer in man and uterine cervical cancer in women.

- Carcinogenic factors : Factors inducing cancer

  (i) Carcinogens / chemical carcinogens

  These are substances / environmental pollutants which causes cancer. Example soot, coal tar (skin an lungs), cigarette smoke (Nnitrosodimethylene – lungs), Cadmium oxide (Prostate gland), aflatoxin (liver) 2-naphthylamine and 4-aminobiphenyl (urinary bladder), mustard gas (lungs) nickel and chromium compounds (lungs), asbestos (lungs, pleural

membrane), diethylstilbestrol (vagina), vinyl chloride (liver), artificial sweeteners, excessive coffins, diet rich in animal proteins (digestive tract), sex hormones (breast cancer).

(iii) Radiations

Both UV and ionizing radiations increase the incidence of cancer. Leukemia incidents are 10 time more in radiologists. Skin cancers are more common in areas with high UV radiations.

(iv) Heat

Reverse smoking causes mouth cancer. Kangri (heating devices) increases incidence of cancer in Kashmir.

(v) Tobacco

Tobacco chewing produces mouth cancer. Smoking increases chances of throat and lung cancer.

(vi) Mechanical agents

Friction, trauma or continuous irritation seems to produce cancer.

- Cocarcinogens

They are chemicals or factors which function as cancer / tumour promoters. Cocarcinogens or epigenetic carcinogens promote neoplastic growth only after inhibition by carcinogen some cocarcinogens are Polonium, Nickel, Nicotine, Saccharine, Menobarbitol

- Mechanism / Carcinogenesis It occurs through following stages

(i) Initiation: Carcinogens produce DNA lesions Epidermiological studies indicate that initiation of cancer occurs in childhood and youth

(ii) Promotion : Proto –oncogenes are changed to oncogenes. A cell with oncogene is called latent tumour cell. Promotion is reversible common promoters are saccharine and phenobarbitol

(iii) Loss of adhesion or loss of contact inhibition : Normal cells do not divide because of contact inhibition. Latent tumour call losers contact with other cells. This changes it into active tumour cell

(iv) Progression : The active tumour cell begine to divide and forms neoplasm or cell aggregate which later turns into tumour. Progression is slow so that external symptoms do not appear till the tumour is formed. It presses adjacent organs and tissue.

(v) Metastasia : Tumour cells are also called cancer cells. They become less adhesive. The cancer cell do not undergo differentiation. They release angiogenic factors which stimulate growth of blood vessels. Soon the cancer cells begin to migrate with or without secondaries

- Cancer cells have irregular, hypertrophied nucleus, abundant nuclear granules, increased number of lysosomes, reduced cristal in mitochondria, more melanin mucus fat droplets and debris in cells. Further, genes llike ERCA1, BRCA2, CDH1, MLH1, PTEN mutate. This reduces the ability of DNA to repair itself. Same of the mutated genes were previously working as tumour suppressor genes

Symptoms

- A lump or hard area, swelling or sore that does not heal, unexpected loss of weight or hoarseness, change in colour of mole / wart, a change in digestive / bowel habits, loss of blood through a natural orifice or excessive loss of blood in women.

Diagnosis

- Biopsy of tissues endoscopy (gastroscope for stomach, laproscope for pelvic region), X-rays ultra –sound.

Anticarcinogens

- They are substances which prevent the action of carcinogens, Anticarcinogens occurs in green yellow vegetables, fruits and milk. They are riboflavin (milk), flavonoids (green yellow vegetables and fruits), vitamin C, indoles (cabbage, cauliflower), retinoids (milk, carrot, butter), some synthetic oxidants in preserved foods (butylated hydroxyl anisol and toluene) etc. β- carotene present in green – yellow vegetables is promoter – inhibitor which weakens the action of cancer promoters

Treatment

- Surgery, bone marrow grafting (Leukemia), radiotherapy (exposure to radioactive isotopes), hormonal therapy, chemotherapy. Two drugs (vincristine and vinblastin) from cantharantus roseus are effective in controlling leukemia. Taxol is anti –cancer drug obtained from Texus baccata.
- Prophylactic intake of taxomifen and raloxifene keeps breast cancer under check . Recently a drug tetrathiomolybdate has been tried with some cancer. It arrests tumour growth by starving cancer cells of copper PARP (Poly ADP ribose poly merase) inhibitors also kill tumour cells with no side effects. Extract from Fagonia cretica has been found to cure breast cancer.

HUMAN HEALTH (SECTION II : IMMUNITY)

- Immunity is the ability of an individual host to resists development of disease and allergy even after having received infective dose of pathogen with complete virulence and the various allergens.
- Immune system is the system of animal body which protects it from various pathogens / infectious agents / allergens and cancer
- Immunology is the science of development of immunity against particular pathogen or allergen
- The foundation of science of immunology were laid by three workers:

(i) Edward Jenner (1796)
A risky inoculation of small pox pustule through a scratch on vein was performed in Turkey and other eastern countries. Jenner noticed that milk – maids did not suffer from small pox though they did develop similar scabs of cowpox. He transferred the material from the scab of milkmaid sarah Nelmes to a young boy of eight years James Phipps. Later he inoculated the boy with live small pox material. The disease did not appear. The procedure was tried on other with equal success. Jenner also coined the term vaccine. He is regarded as father of immunology

(ii) Louis Pasteur (1879)
Developed the technique of weakening or attenuation of pathogen as heat, cold or starvation for preparation of vaccine

(iii) Von Behring (1891)
He discovered the technique of passive immunization by injecting of diphtheria pathogen into sheep and preparing serum from its blood after some time

- The agents which invite action of immune system are micro organism, their products certain food items, chemicals, drugs, pollen and pollutants. Body defense system or immunity is of two basic types, non-specific or innate and specific / acquired

NONSPECIFIC BODY DEFENSE

- It is natural defense system of the body with an individual is born and which is always available to protect the body against various types of discomfort causing environmental agents. This is done by having barriers to prevent entry of foreign agents and dispose of them as soon as they enter the body. Non specific body defense does not involve antigenic recognition. It is also called innate inborn, familial or natural immunity.
- There are number of components of innate immunity anatomic, physiological, phagocytic, inflammatory, natural killer cells and complement system. Theanatomic and physiological barriers constitute the first line of body defense. Phagocytic barriers, inflammatory barriers, natural killer cells and complement system constitute second line of body defense
- Innate immunity or non-specific body defense is only defense for most animals and plants.

(1) Anatomic / physical barrier : These don not allow foreign agents and pathogens to enter the body

(i) Skin : Keratinised dead outer cells of horny layer, do not allow entry of pathogen in body. Oil from sebaceous glands and sweat from sudoriferous glands make the skin acidic with pH 3-5, and possess bactericidal as well as fungicidal properties

(ii) Nostril hair: They filter out dust and micro –organism from inhaled air

(iii) External friendly microorganisms/ friendly bacteria : Many friendly bacteria live on skin, produce acids and secrete chemicals harmful to pathogens

(iv) Mucous membrane: They line digestive, respiratory and urinogenital tracts so as to prevent of entry of germs into body tissues.

(v) Mucus and cilia : Mucous membrane of the nasal tract possesses cilia for pushing back dust and germs. It also secretes mucus for trapping and killing them

(vi) Internal Friendly microorganism: They occur in intestine and vagina. Intestinal microorganisms secrete chemicals harmful to other microbes. Bacteria present in vagina secrete lactic acid for keeping it free from other microbes

(2) Physiological Barriers : They are barriers related to body temperature, pH and chemical of body secretions which inhibits growth of pathogens.

(i) Fever : Thee is rising of body temperature due to toxins released by pathogens and pyrogens produced by leucocytes. Fever stimulates phagocytosis and inhibits growth of many pathogens

(ii) External secretions: Sweat, oil and secretions of external friendly bacteria are acidic to prevent growth of many pathogens.

(iii) Lysozyme: It is a bacteriolytic enzyme present in sweat, tears, saliva and mucus lysozymes bring about hydrolysis / break down of bacterial cell walls

(iv) Activity of stomach : HCl of gastric juice kills most of microorganism ingested with food and drinks.

(v) Bile : It does not allow growth of micro-organisms

(vi) Cerumen (ear wax) : It is secretion of ceruminous glands present in external auditory canal cerumen traps dust particles, kills bacteria and repels insects.

(vii) Interferons : They are glycoproteins which are produced in small amount of certain kinds of cells (wbc, NKC, fibroblasts, epithelial) when infected with virus. Interferons make the surrounding cells resistant to viral infection. Interferons were discovered by Isaac and Lindemann (1957). They are used in treatment of certain cancers, hepatitis, multiple sclerosis, oscteoporsis, influenza etc

(3) Phagocytic Barriers

Phagoctosis is carried out by leucocytes and macrophages. The act as soldiers of defense and scavengers of the body. Phagocytic leucocytes are neutrophils and monocytes. They come out of blood capillaries through diapedesis, engulf and digest most of the microorganisms. Macrophages are modified monocytes. They are large phagocytic cells of two types – fixed (inside lymph nodes, spleen, liver, bone marrow) and wandering (connective tissue). They

constitute reticulo-endothelial system macrophages of liver are present along sinusoids and called Kupffer's cells. Macrophages attack germ and inorganic substances that happen to enter tissues and engulf then. Pus may collect. Puss is a thick liquid formed in the region of wound and is composed of tissue fluid, damaged body cells, dead phagocytes, some leucocytes and microorganisms

(4) Inflammatory Barrier

Inflammation is reaction of living tissues to injury, irritation or infection which is characterized by pain, swelling, redness or heat. Inflammatory response can be localized (area of injury or infection) or systemic (whole body). The injured region attack mast cell (histamocytes) of connective tissue and basophils of blood. They release prostaglandins and histamine. Histamine dilates blood capillaries and other small blood vessels. Therefore, more blood flows into the area of injury making it red and warm. Histamine also makes fine blood vessel permeable, lowers blood pressure and allows greater leakage of phagocytes allows destruction of microorganism. Plasma contains serum proteins with antimicrobial activity. Accumulation of tissue fluid causes swelling and dilution of toxins produced by pathogens.

(5) Natural killer cells (NKC)

They are small lymphocytes / cells of immune system which are specialized to kill virus infected and tumor cells. Killer cells produce perforins . The latter produce pores in the plasma membrane of the target cells. Water enters the perforated cells. They swell up and burst. Cellular remains are then cleared by phagocytes.

(6) Complement system

It is a system of thirty proteins which participate in both innate and acquired immunities in cascade fission for protecting the individual from pathogens. Many of the proteins of complement system function as enzyme precursors. In acquired immunity the system becomes active in response to antigen – antibody complex. It is also called classical pathway. In innate immunity, the complement system is activated directly in response to bacterial endotoxins, microbial polysaccharides, cell wall and other components of invading themicroorganisms. It is called alternate pathway as well as properdin system. The pathway helps in dealing with invading microorganisms even before a person becomes sensitized against them, certain proteins of this system cleave and form two components, membrane attack complex and biologically active fragments. Membrane attack complex functions as lytic complex which produces trans membrane pores in the microbes. The latter burst and die. Biologically active fragments produce opsonins, anaphylotoxins and chemotactic factors. They form a coat over the invading microbes and attract phagocytes (neutrophils and macrophages) for engulfing them. Complement system also causes agglutination of microbes, neutralization of viruses, activation of mast cells and basophils and has some direct inflammatory effect.

SPECIFIC BODY DEFENSE / ACQUIRED IMMUNITY

- It is immunity obtained during the life of an individual against a particular microorganisms due to previous infection vaccination or inoculation of antiserum. Specific body defense is also called acquired adaptive or specific immunity. This type of immunity occurs only in vertebrates. It

supplements protection provided by innate or inborn immunity. However it takes a few to several days to become effective. Acquired immunity is also called third line of body defense.

- It has four unique characteristics:

(i) Specificity – It is a specific for each type of pathogen.

(ii) Diversity – Acquired or adaptive immunity can develop against all the diverse type of pathogens their toxins and other molecules

(iii) Discrimination between self and nonself – It can differentiate foreign (non self) and body (self) cells and molecules. Only the foreign or nonself materials are attacked

(iv) Memory – The first encounter between the specific foreign agent or microbe and the body's immune response but also memory of this encounter. Because of it a second encounter with the same microbe brings about quicker and heightened response.

- Acquired immunity or specific body defense is of two type

i) Active (acquired) immunity

This involves the active functioning of the person's own immune system leading to the synthesis of antibodies and / or production of immunologically active cells Active immunity is produced by clonal selection and expansion. This occurs because interaction of an antigen with its receptors on the lymphocytes surface stimulates cell division, so that more lymphocytes are available to combat subsequent exposures to the same antigen Clonal selection lead to the eventual production of :

(i) A pool of antibody – secreting plasma cells plasma cells are B-cells that have booled up (forming a large endoplasmic reticulum) for massive synthesis and secretion of an antibody. The antibody is the secreted version of the BCB (B-cell receptors for antigen)

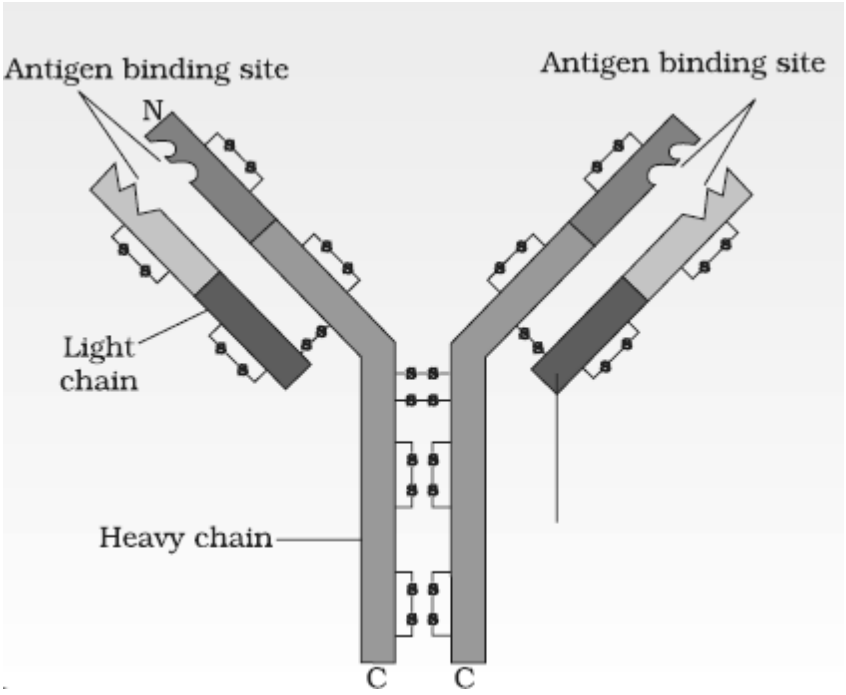
(ii) A pool of ' memory ' cell – These are B lymphocytes with receptors of the same specificity as those on the original activated B cell

(iii) Passive (acquired) immunity

- Immunity is said to be passive when antibodies produced in other organisms are injected into a person who already has potential antigen in his body. Passive immunity is developed to counteract snake venom, rabies, tetanus toxin and salmonella infection

- An antigen or immunogen is any foreign substances like protein or polysaccharide present in the external coating of pathogen, toxin of pathogen, white egg, feathers, constituent of vegetable, fruit, meat, drug chemical, tissue or organ transplant which induces the immune system to produce antibodies. Sites over the antigens that are recognized by antibodies and receptors found on B and T cells are called antigen determinants (epitope). An antigen may have one to several types of antigen determinants
- Antibodies are glycoproteins which are of innumerable types, each specific to specific antigen. They occur in blood plasma as gamma-globulins or immunoglobulines (Ig). About 20% of plasma proteins are antibodies, each antibody consists of four polypeptides, two long heavy or H chains and two short, light or L-chains. They are held together in a Y-shaped configurations. Long H-chains are present throughout while short L-chains are restricted to the two arms. The tips of the two arms posses a specific architecture that fits over the antigen determinant in a lock and

key fashion to form antigenantibody complex. The antigen binding fragment (Fab) of arms is called variable or V-region while the stem and basal parts of arms of antibody form constant or crystalline fragment (Fc). The latter determines diffusivity and adherence of the antibody



IMMUNOGLOBULIN CLASSES AND THEIR FUNCTIONS

- IgA: Called secretory immunoglobulin because it is present in all body secretions including colostrum and mother's milk. Functions as first line of defense against inhaled and ingested pathogens by activating alternate pathway of complement system.
- IgD: Along with IgM occurs over B-lymphocytes as antigen receptors activation of B-cells, also present in serum tissue and effective against toxins and allergens.
- IgE : Present in mucous membranes, skin and lungs. Attaches to mast cells and basophils for releasing histamine and other substances that mediate hypersensitive response to allergens.
- IgG : Constitue 75% of total Ig, present in call body parts including milk and can pass through placenta providing passive immunity to neonates, stimulates complement system and phagocytes against toxins, fungi, viruses and bacteria
- IgM : Largest Ig with 10 binding sites, activates B-cells over which it is present along with IgD, also first to reach the site of infection and activate classical pathway of complement system.

COMPONENTS OF IMMUNITY SYSTEM

- Immunity system contains antibodies, specific cells, tissues and lymphoid organs. It takes part in recognition of foreign antigens, eliminates them and keeps a memory of the same. It has also a role in allergies, autoimmunity and organ transplantation.
- Immune system has two components humoral and cell mediated.

Humoral Immune System or antibody mediated immune response (AMIR)

- Antibody – mediated immunity is associated with the appearance of antibodies, secreted by cells of the B-lymphocyte series, in extra cellular fluids such as plasma, lymph and external secretions.
- The AMIR defends the body against
  a) Some viruses.
  b) Bacteria with polysaccharide capsule.
  c) Toxins that enter the body fluids (blood and lymph).
- When antibodies on a B cell's surface bind antigens, the B cell is activated and divides producing a clone of daughter B Cells. The daughter cell specialize into plasma B cells and memory B cells
- The plasma B cells are antibody factories. The antibodies pass into and circulate in three lymph to dispose of the antigens. For this, the antibodies selectively bind to the antigens forming antigen – antibody complexes to destroy the antigen. Each person can make 107 to 108 different kinds of antibody molecules so that there is an antibody molecules, so that there is an antibody on a B cells to fit any antigen
- The plasma cells do not migrate to the site of infection and act through a fluid (lymph). Hence they are said to form humoral immune system (L. humor = liquid). The B – lymphocytes are short lived and are replaced every few days from the bone marrow
- The memory B cells live for a long time and serve to quickly dispose off the antigens in case re-infection of the same virus or bacterium occurs.
- The antibiotics bind to their specific antigens an inactivate the invading microorganism or foreign molecules so that these are conveniently disposed of by the pathogen.
- The antibodies fight the antigene in five different ways

(i) Neutralization – some antibodies neutralize the antigens termed toxins and make them ineffective. They are called antitoxins. The phagocytes dispose off the neutralized antigen – antibody complexes

(ii) Agglutination – Certain antibodies causes the particulate antigen to stick together in clumps, thus immobilizing then for easy disposal by the phagocytes through ingestion. They are termed agglcutinins.

(iii) Opsonziation – Other antibodies coat the surface of the microbes and make them more susceptible to phagocytosis. Such antibodies are known as opsonin

(iv) Precipitation – other antibodies combine with the antigens to form precipitates that are easily ingested by phagocytes

(v) Complement activation – Antibody antigen complexes activate complement protein which may –

a) Lyse cell walls of bacteria, causing their disintegration.
b) Incite inflammatory response.
c) Opsonize antigen.
d) Attract phagocytes to area of infection.

Cell mediated immunity / Action of T cells

- T cells are long – lived cells which have upto 100,000 receptors sites on their surface for binding antigens. The cells develop antigen specificity through previous contact. They are often called competent lymphocytes. The latter respond to specific antigen by forming a clone of cells. The cells then differentiate into following types

1. Cytotoxic or killer T-cells : The cells reach the site of infection or agglutination and get attached to antigen containing microorganisms. They secrete perforins that produce holes in the attached cells. The killer T cells then pass toxic chemicals into attached cell for killing the same. Afterwards they move away for attacking new antigen containing cells. Killer T cells attack virus, invaded cells, cancer cells and cells of transplanted organs. They also destroy helper T cells when the latter are invaded by HIV. AIDS is due to deficiency of helper T cells. The killed cells are removed by phagocytes
2. Helper T cells : They constitute more than 75% of total T- cells. They regulate immune functions by secreting lymphokines. Interleukin-2 has positive feedback system for helper T cells, stimulates growth and proliferation of other T cells. Interleukin-4,5 and 6 stimulate B lymphocytes macrophages are attracted to the site of infection and stimulated to phagocytosis by lymphokines.
3. Suppressor T cells : The cells act as negative feedback and keep the activity of other T-cells under check. This protects the body tissues and chemicals from attack of phagocytes and their antibodies
4. Memory T cells : They are sensitized T Cells which retain memory of antigen specificity for future. Sometimes lifelong. Other T Cells are amplifier T cells, killer, helper and suppressive T-cells are also called effectors cells.

CELLS OF IMMUNE SYSTEM

- They are lymphocytes and antigen presenting cells like macrophages. A healthy human has about a trillion lymphocytes. Lymphocytes are of two types, T-layphocytes (T-cells) and B-lymphocytes (B-cells). Both of them develop in bone marrow from lymphatic system cells by the process called haematopoiesis, some of the young lymphocytes migrate into thymus for preprocessing. They are called T-lymphocytes. Afterwards they pass on to all the lumphoid tissues of the body and get lodged there. The other types of lymphocytes remain in the bone marrow and get preprocessed there. They are called B lymphocytes because in birds they are preprocessed in lymphoid diverticulum of cloaca called bursa of Fabricius. After being

preprocessed B lymphocytes also migrate to all the lymphoid tissue of the body where they reside near but separate from T-lymphocytes

- MHC / HLA molecules (HLA antigen) Polymorphic molecules call MHC class I are present on most body cells, Another group of molecules, , MHC class II, occur over professional antigen presenting cells. They bind to peptide antigen producing MHC antigen complex. The same is present to CD4 and CD8 T-cells respectively
- Activation of adaptive / acquired immunity
- An antigen is processed by antigen presenting cells like macrophages and Blymphocytes. A type of T-cells (T-helper cells) interacts with presented antigen and becomes activated. The activated T-cells not only form a clone of T-cells but also B-lymphocytes.

CLONAL SELECTION

- Formation of a clone of cells by each activated T-lymphocyte and antibody producing plasma cells by activated B-lymphocyte, each exhibiting the specificity for the same antigen is called clonal selection. The cells are of course of more than one type and perform different functions. One type of cloned lymphocyte do not function as effector cells but instead develop into long lived memory cells.

PRIMARY AND SECONDARY IMMUNE RESPONSES

- Primary immune response is the first immune response developed during the first encounter with the antigen. It is feeble but relatively longer
- Secondary immune response is quick heightened immune response against a subsequent encounter with some antigen. It is due to the presence of memory cells against that antigen. A person having caught chicken pox or measles only becomes immune to subsequent attack of the pathogen due to it.

LYMPHOID ORGANS

- They are those organs having lymphatic tissues where maturation and proliferation of lymphocytes occur. The sites where T-lymphocytes and Blymphocytes mature and develop antigen specific receptors are called primary lymphoid organs viz. thymus for T-lymphocytes. And bone marrow for Blymphocytes
- Secondary lymphoid organs are those organs having lymphatic tissues where B and T-cells are settled after maturation and where they undergo proliferation / differentiation on being activated by specific antigens e.g. lymph nodes, spleen and tonsils, MALT is mucosal lymphoid associated tissue. It constitutes more than 50% of the total lymphoid tissue.

VACCINATION AND IMMUNISATION

- Immunization is phenomenon of increasing specific antibody production and development of memory B and T cells against the potential attack of a pathogen. It is carried out through vaccination and injection of antiserum. When an immunized person is attacked by the pathogen,

the existing antibodies immediately attack the antigen while the memory T and B cells give rise to a massive crop of lymphocytes and antibodies.

- Vaccination is a process of inoculation of harmless antigenic material into healthy person for providing active acquired immunity against the disease. A single vaccination against the disease. A single vaccination may not give adequate immunity. Therefore 2-3 booster doses of vaccine are administered later on at specific intervals. Vaccine is suspension / extract of weakened attenuated dead germs or antigen containing compound of pathogens which when injected into healthy person provides active acquired immunity to the disease
- Now vaccines are also available for diphtheria, cholera, typhoid, whooping cough, tetanus, tuberculosis, plague, measles, mumps and polio. The cells infected with cancer causing viruses usually show on their surface to the virus. This has led to the first successful immunization against cancer in cats and chickens. Unfortunately, efforts to produce antibodies to cancers not caused by virus have had very little success
- Many serious infectious diseases also have no effective vaccines. These include malaria, trypanosomiasis and AIDS
- In India, vaccines are generally produced at Hoffkins Institute at Mumbai and Virus Institute at Pune
- National Institute of Immunology (NII), New Delhi is involved in the production of antifertility vaccine kits to detect pregnancy and infectious disease etc.

DISORDERS OF IMMUNE SYSTEM

AUTOIMMUNITY (Auto immune diseases)

- Auto immunity is an abnormal immune response against self antigens. When the cell acts as antigens in the same body then they are called autoantigens
- The nature of auto immune diseases depends on the autoantigens involved. For example, if the autoantigens are RBC then the body destroys its own RBCs, resulting in chromic anemic, if the autoantigens are muscle cells then it results in the destruction of its own muscles resulting in severe weakness (myasthenia gravis); if the autoantigens are liver cells, then it results in chronic hepatitis, etc. Other autoimmune diseases are insulin dependent diabetes, Addison's disease, ulcerative colitis and rheumatoid arthritis

ALLERGY (Hypersensitivity)

- Allergy is the inappropriate immune response of person to harmless substances coming in contact with the body or entering the body from the environment or in food or in medicine
- The substances which causes allergic reaction are called allergens. They are generally weak antigens. The common allergens are dust, dust mites, cat, pollen, feathers, fur, venom etc.
- Allergic reaction depends on the nature of the allergen. The common allergic reactions are inflammation of mucous membrane, sneezing, gasping, running of eyes, irritation of upper respiratory tract, itching, skin rash

- Allergy involves mainly IgE antibodies and histamine. It causes marked dilation of all the peripheral blood vessels and the capillaries becomes highly permeable so that large amounts of fluid leak out from the blood into tissues. The blood pressure decreases drastically often resulting in the death of the individual within a short time
- Hay fever : In this allergic form, there is swollen, reddened, running eyes and nose. The drugs called antihistamines are of major importance in treatment.
- Asthma: The tissue surrounding the respiratory tubes in the lungs swell up and compress the tubes. Hence there is difficulty in breathing. Antihistamine drugs are also given in this disease

IMMUNODEFICIENCY

Severe combined immune deficiency (SCID)

- Severe combined immunodeficiency (SCID) represents a group of rare, sometimes fatal congential disorders characterized by little or no immune response
- It is a defect in the specialized white blood cells (B and T-lymphocytes)
- Without a functional immune system, SCID patients are susceptible to recurrent infections such as pneumonia, meningitis and chicken pox. Though invasive, new treatment such as bone marrow and stem cells transplantation save as many as 80% of SCID patients.
- Sometimes new born children are without T-cells and B-cells. These children are susceptible to various infections
- SCID is caused by a defect in the gene that codes for the enzyme adenosine deaminase on chromosome number 20. Lack of the enzyme adenosine deaminase (ADA). Means that the substrate for this enzyme accumulate in the cells. Immature lymphoid cells of the immune system are particularly sensitive to the toxic effects of these unused substrates, so fail to reach maturity.
- As a result, the immune system of the afflicted individual is severely compromised or completely lacking. Lack of this enzyme makes the body defenseless against infections.
- SCID is the first genetic disorder to be combated with gene therapy.

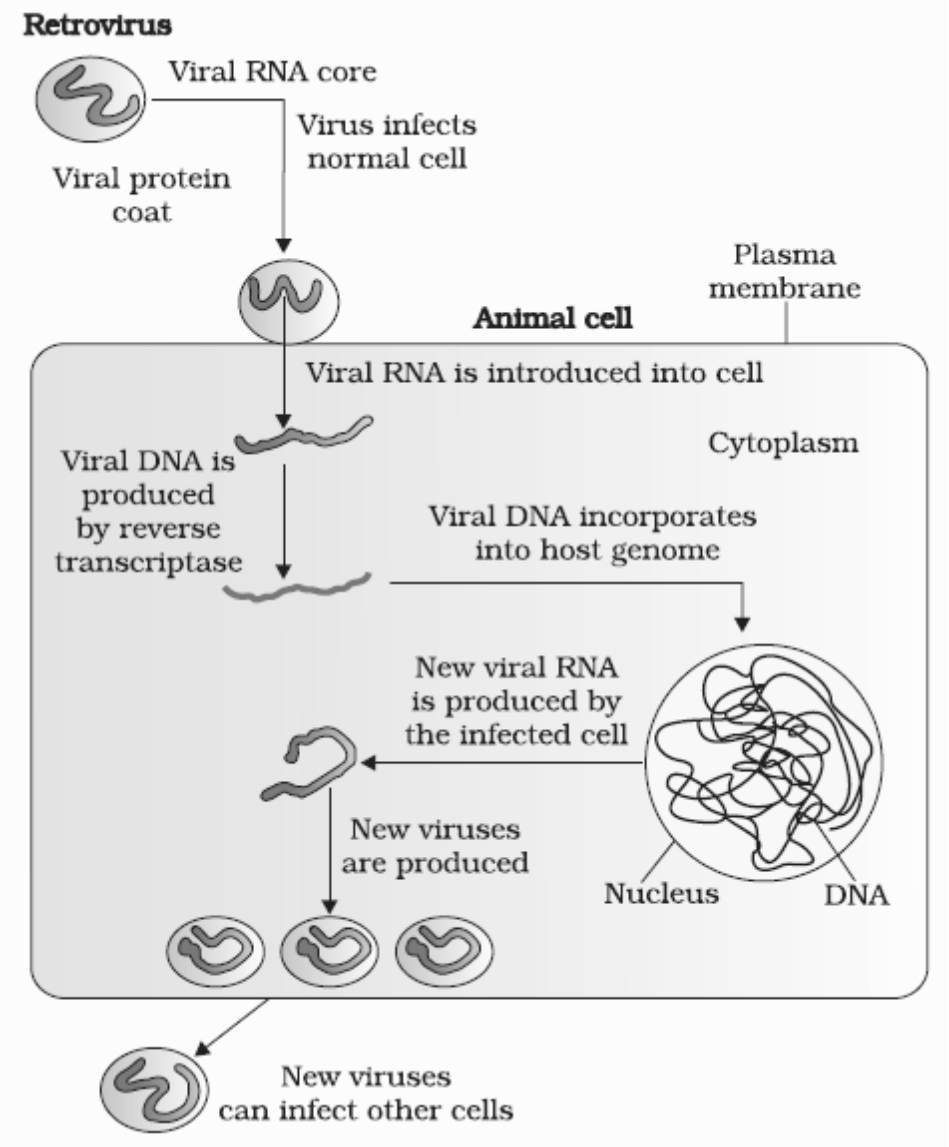
Acquired immune deficiency syndrome (AIDS)

- AIDS is a disorder of cell mediated immune system of the body. There is a reduction in the number of helper T-cells which stimulate antibody production of B-cells. This results in loss of natural defense against viral infection
- AIDS infection were detected in India for the first time in prostitutes of Chennai in 1986.
- Virus responsible for AIDS was identified and named HIV

AIDS virus – HIV

- HIV virus belong to the retrovirus family, a family of single stand RNA viruses distinguished by possession of viral reverse transcriptase that transcribes viral RNA into provirus DNA which is integrated into the host cell genome.

- HIV is 100 to 140 nm in diameter, has a cylindrical core, single-stranded linear RNA and reverse transcriptase enzyme surrounded by glycoprotein coat, double lipid membrane and two protein coats
- Virus of AIDS was isolated and identified in green monkey by Prof. Luc Montagnier in France in 1983 and almost the same time by Prof Robert Gallo in USA (1984)
- HIV is subdivided into two distantly related types, HIV-1 and HIV-2. HIV-1 is the predominant world wide isolated from individuals with AIDS or at high risks for the development of AIDS. HIV-2 is endemic among people in west Africa.



- HIV -1 and HIV-2 differ in their ability to cause disease and their geographical distribution
- Both, HIV-1 and HIV-2, cause the body to produce antibodies with three to six months, although the period between initial infection and illness may be longer in case of HIV-2
- The incubation period of HIV is 15 -57 months. Average incubation period is 28 months

Transmission

- AIDS is transmitted only by a constant of infected cells containing blood of a patient with the blood of a healthy person as in:

(i) Unprotected sexual intercourse with an infected person
(ii) Use of contaminated needles and syringes to inject drugs or vaccines.
(iii) Use of contaminated razors for shaving
(iv) Use of infected blood or blood product for transfusion
(v) Organ transplant
(vi) Parturition from mother to baby due to rupturing of blood vessels

- The sexual rout of transmission accounts for over 75% of infections
- AIDS can not be acquired by

i) Insect bites
ii) Crowded transport
iii) Shaking hands
iv) Sharing towels
v) Coughing and sneezing
vi) Kissing and embracing
vii) Sharing utilities

Signs and symptoms of AIDS

- People infected with AIDS virus remain apparently well even after infection. They may not show any physical symptoms of illness for a long time
- When the AIDS virus enters the blood stream it begins to attack certain white blood vessels and antibodies. These antibodies can be detected by a specific blood test usually two weeks to three months after infection.
- In some people, the protective immune system may be destroyed by the virus and then other germs that ordinarily do not attack cause opportunistic disease to infect and destroy the body.
- Opportunistic infections occur during the last phase of HIV, which can occur up to 10 to 11 years after the infection. These infections are described as AIDS related complex (ARC)
- AIDS virus may attack nervous system causing damage to the brain resulting in memory loss and other neurological disorders.
- Some early signs may be persistent cough and fever associated with difficulty in breathing.
- Certain cancers
- Tuberculosis
- A typical pneumonia by fungus pneumocystis carinii
- Brain damage
- Night sweats and tiredness
- Swollen lymph nodes and fever
- Weight loss, chronic diarrhea that last for more than one week, loss of appetite and lack of resistance to infection.

Diagnostic test

- HIV is diagnosed by testing the blood for the presence of antibodies to the virus.
- ELISA (Enzyme -linked immunosorbent assay) screening test is the initial one. The test works by detecting antibodies, substances, proteins which are produced in the blood, when the virus is present.
- Western blot test will confirm the result of repeated test through detection of HIV proteins.
- Viral load test measures the amount of virus in the blood which will help in determining the probable progression of the disease

Treatment

- However, no specific treatment has been found so far, and the mortality from AIDS is virtually 100%
- A combination of three and more antiretroviral agents, called triple therapy or highly active anti-retroviral theory (HAART), has been highly effective in reducing the number of HIV particles in blood stream though HAART is not cure for HIV.

Prevention

- The following steps may help in controlling this dreaded disease:

i) People should be educated about AIDS transmission, advantage of condoms.
ii) Disposable needles and syringes should be used
iii) High risk group should be refrain from donating blood
iv) Sexual habits should be changed
v) Before receiving blood, ensure that it has been screened for HIV
vi) While getting dental treatment, insist on the use of thoroughly sterilized equipment.

- December 1 is celebrated every year as the world AIDS Day

(SECTION III : MENTAL HEALTH AND ADDICTION)

- Mental health is a state of balanced development of individual's personality and emotional attitude towards family members, society, social institutions, leisure and balanced satisfaction of potentially conflicting instinctive drives.
- In 1950, a WHO experts committee on mental health reviewed the various definitions of metal health and observed that mental health is influenced by biological and social factors and is not static condition but subject to variation and fluctuation
- A mentally healthy person has:
  - Self respect.
  - Knowledge of one's possibilities and limits.
  - Independent personality but comfortably placed in hierarchy in work, family and society.
  - Feeling for friendship and trust for other
  - A purposeful life with reasonable goals to achieve
  - Potential to perform all the daily chores not dependent on any other person.
  - Ability to meet all the demands of live solving problems as they arise.
- A mentally sick person has:
  - Inability to concentrate.
  - Absence of sound sleep.
  - Worrisome behavior.
  - Short temper.
  - Unhappiness.
  - Mood fluctuations from depression to elation.
  - Tendency to get upset by a change in routine.
  - Apprehensive nature.
  - Bitterness.
  - Dislike of others.
  - Considering others to be wrong.
  - Feeling of pains/aches in different body parts without any actual ones
- 10^{th} of October is observed as the "world mental Health Day".

TYPES OF MENTAL ILLNESS / MENTAL DISORDERS

- It is of three types:
  - Psychosis / Insanity / Madness
  - Mental disability
  - Neurosis / psychoneurosis

PSYCHOSIS / INSANITY / MADNESS

- It is a severe type of mental illness or disorientation in which the patient no longer remains in touch with realities of life.
- These patients are usually associated with other defects such as diabetes, high blood pressure, tuberculosis and other diseases of central nervous system.
- The patient is not aware of illness and refuses to take the treatment.

MENTAL DISABILITY

- Mental disability are caused by physical, physiological and psychological defects like

a) Injury
b) Nutritional deficiency during development of infant.
c) Radiation damage during neutral development.
d) Toxicity of lead and mercury.
e) Degeneration due to ageing.
f) Tumors.
g) Poor availability of oxygen , blood supply.
h) Excessive intake of alcohol.
i) Excessive use of psychotropic drugs.

- Epilepsy is a mental illness characterized by abnormal electrical discharge in a part of brain often leading to warning cry, fits of convulsions like jerking, stiffness, tongue biting, sensory changes, loss of bladder and bowel control, ending in loss of consciousness falling down and sleep.
- Parkinson's disease is a sporadic disorder of middle and late life which is characterized by stooped posture, stiffness and slowness of movements, fixity of facial expression and rhythmic tremor of limbs which subsides on relaxation or activity willed movement
- Alzheimer's disease is a progressive degenerative disease of brain which is caused by senile plaques and neuro –fibrillary tangles resulting in loss of choline acetyetransferase activity.
- First signs are subtle changes in personality, memory disturbance and trembling of hands. It is followed by progressive increase in dementia over 5-10 years. This disease commonly appears after the age of 40, though it can occur in any age group.

NEUROSIS / PSYCHONEUROSIS

i. Anxiety disorder : It is a group of mental disorder in which the patient shows anxiety to stressful event, panic disorder, associate with a range of unpleasant symptoms like palpitation, sweating, nausea, trembling, diarrhea, muscular tension etc. School phobia, social phobia, agoraphobia and separation anxiety disorder are some common anxiety disorders found in children and adolescents.
ii. Obsessive – compulsive disorder : That are psychological disorders characterized by recurrent obsessions or compulsions, severe enough to interfere with person's working house, personal or social functioning. Performing the compulsive ritual releases tension temporarily but resisting the

same increases tension. The common obsessions are constant doubts, violence, contamination of dirt and germs.

iii. Attention deficient disorder : The disorder is more common in young boys and is characterized by restlessness, nervousness, difficulty in remaining seated, easy distractibility, inability to follow instructions, under achievement, behavioral problems and tendency to be disliked by other children.

iv. Mood disorder: They are mental disorders characterized by disturbance of mood (depression disorders), bipolar disorder with alternate bouts of low (depression) and high (elation, manic) moods. Depression is a mood disorder characterized by feeling of sadness, despair /hopelessness, low self esteem, uncontrolled weeping, decline in interest, energy, concentration, changes in sleep pattern and appetite In bipolar mood disorders, depression alternates with manic mood or mood of exaggerated arousal over – activity and taking of several task simultaneously

v. Schizophrenia – It is a mental illness or disorder which is characterized by
   a) Distorted thoughts, auditory hallucinations, delusion, sense of being influenced by other, feeling of being controlled by outside forces
   b) Shallowness of emotional life, often shifting from one response to another
   c) Progressive deterioration of personality.
   d) Laughing and crying at inappropriate occasion.
   e) Incoherent / bizarre behavior lasting for few days.
      - As the schizophrenias suffer from hallucination and delusions, they are unable to perform even simple jobs.
      - Schizophrenia can be due to excessive dopamine production, alterations in neuropeptides, increased ventricular brain ratio and decrease in frontal lobe activity. Recovery is possible with regular use of chloropromazine along with psychosocial therapy.

vi. Borderline personality disorder (BPD) : It is an emotionally unstable personality disorder where the patient suffers from impulsively unpredictable moods, outburst of emotions, uncontrolled anger, impulsive and self damaging acts and repeated conflicts with other. BPD is characterized by a specific patterns. BPD is characterized by a specific pattern of behavioral, emotional, cognitive instability and dysregulation.
      - The individual over-react with problem of anger and anger expression. There are episodes of depression, anxiety and irritability. The patients have fear of abandonment. Therefore, besides having chaotic relationship with others, they are always tense and hard to give up. Patient feels boredom or emptiness. They have a recurrent tendency of self mutilation, injury and suicidal tendency.

ADOLESCENE

- It is a period of extreme turbulence (9 -18 yrs in girls and 10-19 years in boys.) which begins with the appearance of first signs of puberty and terminates with cessation of some somatic growth.
- A healthy adolescence is essential for healthy adulthood because adolescence is a preparatory phase for adult life when physiological and physical developments occur in the body. It is

accompanied by mental development and behavioral adjustments. The adolescence comes out of the familial environment and begins to find out self identity and position in the outer world.

COMMON PROBLEMS OF ADOLSCENCE

1) Acne
   It is a skin disorder of adolescents of both sexes where eruptions / pustules develop over face, chest and back caused by over activity of sebaceous glands and clogging of skin pores in response to influx androgen. Acne appearing on face makes oneself conscious because of their unsightliness. A proper understanding of their being natural and requiring proper medical treatment helps the aldoscent to come out of the stress.
2) Hypochondria
   It is a mental disorder in which the patient is preoccupied with body functions and normal sensations finding faults and seeking medical attention. Negative diagnostic evaluations and guarantee of good health by physicians increase the patient's concern. Hypochondria usually occur in late developer adolescents due to anxiety syndrome.
3) Moods
   Socially and emotionally, adolescents feel alternate moods for loneliness and gregariousness. Most of it depends upon their friends and social circle. There are periods of social awkwardness, exhibitionism and aggressive self assertion
4) Craze
   There is a tendency to attract attention and appear different from others. Some adolescence become conscious of their weight and tend to eat little resulting in development of various type of deficiencies. Some adolescents develop excessive craving for food, resulting in overeating and obesity
5) Physiological Aberrations
   Some adolescents may suffer from perceptual disturbances or physiological aberrations like irregular/ absence of monthly periods in females. They must be got attended to by experts.
6) Neurasthenia
   It is a chronic mental and physical weakness and fatigue which results inability to concentrate and enjoy. There is development of insomnia, headache, depression and irritability.
7) Phobias
   They are persistent, irrational, intense fears of specific objects, activity or situation. Phobias are of various types like acrophobia (fear of heights), agoraphobia (fear of open space), arachnophobia (fear of spiders) claustrophobia (fear of confined space, cynophobia (fear of dogs), scotophobia (fear of darkness), social phobia (fear of embarrassment in social situations)
8) Post – traumatic stress disorder
   It is a mental disorder in which is a result of traumatic event like rape, assault, natural

disaster, torture, etc in which the patient re-experiences the traumatic event in recurrent intrusive recollection, nightmares or flash – back. A treatment by psychiatrist is required.

9) Addiction

Addiction is a state of being up to some habit forming articles like drug, alcohol, tobacco smoking or chewing. It begins in adolescents due to curiosity, advertisement, peer pressure, elders, frustrations, or depression, feeling of independence, false belief in enhanced performance etc.

ADDICTION

- Addiction is the state of being given up to an habit , drug, alcohol, tobacco etc. due to becoming physically, psychologically and physiologically dependent upon the same is called addict.
- Medically, addiction is of three types
  (i) Drug addiction / drug abuse
  (ii) Tobacco addiction
  (iii) Alcohol addiction

DRUG ADDICTION OR DRUG ABUSE

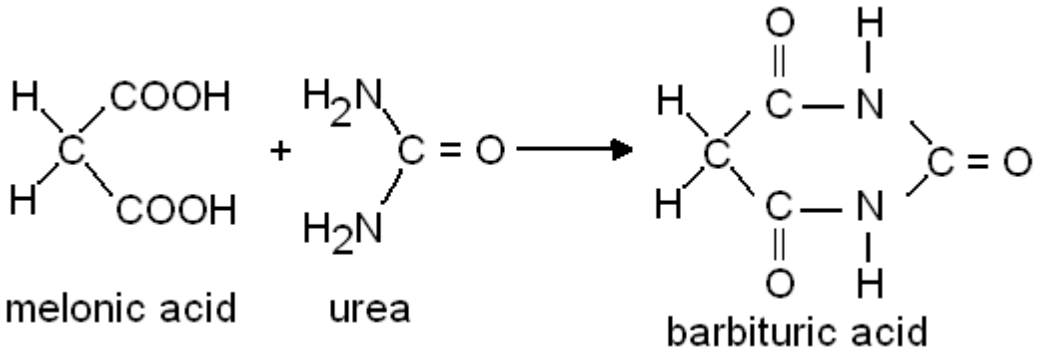
- Drug abuse is taking drugs for purpose other than clinical use, in amount, concentration or frequency that impair physical, physiological and psychological functions of the body
- It is intake of drug:

(i) Without valid medical prescription
(ii) For non medical purposes
(iii) In amount, strength, manner or frequency that damages the physical and mental functioning of an individual

Psychotropic drugs

I) Sedatives and hypnotics

- These are antidepressant drugs or formulation which overcome mental irritability and excitement, assuage pain and lower activity causing drowsiness or sleep. The sleep inducing drugs are also called hypnotic. Examples Barbiturates, benzodiazepines, furazepam, echinamate etc.
- Barbiturates are derivatives of barbituric acid that bind GABA receptors or nervous system and keep the chloride channels open for longer period
- This depresses activity of excitable cells and induces sleep, hence used as sleeping pills
- Repeated use leads to skin allergy and coma, while withdrawal may lead to epilepsy.
- Benzodiazepines are antianxiety as well as sedative drugs.



II) Tranquilizers

- They are antidepressant drugs with calming and soothing effect
- Major tranquilizers are the one which is used to treat psychotic state, minor or common tranquilizers are employed to treat anxiety
- Common tranquilizers are antianxiety drugs that reduce mental tension and fatigue without inducing sleep. Most of them are bezodiazepins like diazepam (valium, calmose), chlordiazepoxide (Librium), lorazepan (larpose), nitrazepam (hypnotex) alprazolam (alprax)
- Reserpine (alkaloid from Rauwolfia serpentina) is used as tranquilizer as well as antihypertension drug. It is however known to be precipitate suicidal tendency, mental depression and epileptic convulsions.
- Tranquilizers bring about relaxation of muscles, block reflexes, increase frequency of chloride opening channels and reduce excitability of cells. Drug abuse leads to behavioral changes, non-coordination of body movement, headache impairment of memory and sexual functions
- Some drugs have both sedative and tranquilizer properties. They are called tranquilo-sedatives Example : Diazepan (valium)

III) Opiate / opioid narcotics

- The opiate narcotics are drugs that suppresses brain activity and relieve pain. They are popularly called pain killers. They also have a sedative and astringent effect. The opiate narcotics are also used for cough relief and for the treatment of vomiting and diarrhoea
- The bad effects of casual opiate users:

- Drowsiness
- Reduction in visual activity
- Constriction of pupil
- Impaired attentivity
- Apathy or loss of interest at work
- Nausea and vomiting
- Slow breathing
- Slow pulse
- Slurred speech

- Its continued use brings about:

- Impaired digestion and absorption.
- Loss of weight
- Sterility
- Chances of respiratory and cardiovascular arrest.
- Poor immunity with repeated infection
- Opiates taken intravenously may cause blocked veins, hepatitis and HIV infection.

Opium

- Opium is the air-dried, milky latex obtained by incising the unripe (fruits) of white poppy plant, papaver somniferum or its varity P.album
- It is the most effective pain killer and also induces a state of euphoria, an exaggerated feeling of well being, also called “high” opium is eaten or smoked. Opium contains some twenty alkaloids. Its main derivatives are morphine and codeine

(ii) Morphine

- It is the active principle of opium morphine is the most valuable analgesic. It is also used as sedative and an antianxiety agent.
- It is widely used in small doses to relieve pain and induce sleep in case of serious injury, burns, fractures and surgeries.
- Morphine reduces heart beat, blood pressure and urine output, increases blood sugar and causes constipation.

(iii) Codeine

- It may be obtained from opium or morphine. It is in fact, methylmorphine
- It has mild analgesic properties. It does not cause addiction. It is an ingredient of many medicines and cough syrups. A notable side effect of codeine is constipation

(iv) Heroin

- Heroin is a white or brown crystalline semi-synthetic compound prepared from morphine by acetylation. It is the most dangerous apiate. It is thrice as potent as morphine and about 200 times stronger than opium.
- It is highly addictive. It is banned even for medical use except for research.
- Heroin may be orally taken, inhaled or injected. It induces drowsiness and lethargy. It’s after effect includes impaired digestion, decreased weight, reduced vision, sterility and total loss of interest in work
- Withdrawal symptoms of heroin include vomiting, diarrhea, shivering, running nose, muscular cramps and epilepsy

(v) Smack

- It is a crude by-product of heroin synthesis and is commonly called 'brown sugar'. The addicts heat the smack powder and inhale its vapour. Smack is diacetylmorphine hydrochloride. It is a stronger analgesic than morphine

(vi) Pethidine

- Pethidine is a widely used narcotic analgesic. It has sedative and euphoric effect also. It has a local anesthetic action.

(vii) Methadone

- Methadone is an orally effective analgesic. Its action is slightly stronger and longer than that of morphine. It causes psychic and physical dependence, but withdrawal symptoms are mild.

IV) Stimulants

- The stimulants temporarily stimulate the nervous system, make a person more wakeful, alert and active and cause excitement.

(i) Caffeine

- Caffeine is a mild stimulant. It is 1,3,7 trimethylxanthine. It is white, crystalline slightly bitter alkaloid and is commonly taken as beverages – tea, coffee, cocoa and cola drinks. It is also taken in chocolate bar and chocolate confectionary
- Caffeine increases the metabolic rate of neurons, thereby increasing alertness and thought. It improves performance and removes freedom. Higher dose cause nervousness, restlessness and insomnia. Excessive intake of caffeine causes addiction
- A cup of tea contains 30-75 mg of caffeine and 200 ml cola drinks has 25-60mg
- Excessive use causes anxiety, irritability diarrhea, irregular heart beat and decreases concentration. It also causes indigestion and disturbs pancreatic and renal functions
- Withdrawal from caffeine leads to headaches, disturbed sleep, lethargy etc.

(ii) Cocaine (coca alkaloid)

- It is an alkaloid and is extracted from dried leaves and young twigs of the south American shrub called erythroxylon coca. It is also synthesized from ecgonine or its derivatives.
- Cocaine is vaso-constrictor and is, therefore, used as local anesthetic
- Cocaine is CNS stimulant. It increases mental alertness and physical strength. It gives a feeling of well being and delays fatigue. It causes lack of sleep and loss of appetite. It is taken for excitement by addicts. Its use may ultimately lead to mental disorder and insanity. Its overdose may cause severe headache, convulsions and death due to respiratory or cardio-vascular failure

(iii) Carck

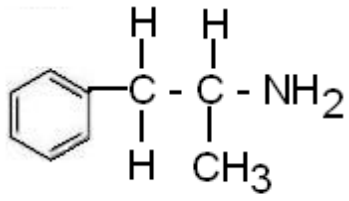
- Crack is highly potent smokable derivative of cocaine. When smoked, it results in a brief intense 'high' and intense craving for the drug arises in the user
- Crack may cause complication such as heart and nasopharynix damage, seizures and mental problem

(iv) Betel nut

- Kernel of the betel nut palm. Areca catechu enclosed in betel leaves and mixed with an aromatic paste is chewed extensively in India and Africa. It contains an alkaloid arecoline and red tannin. It is mild CNS stimulant. It stains teeth and gum red.

(v) Amphtamines

- These are synthetic drugs, commonly called antisleep drugs. The amphetamines are strong CNS stimulants and produce increases selfconfidence and flow of ideas besides causing excitement and alertness. They are thought to increase physical and mental performances. They are taken by truck driver, students and night workers to keep awake. They impair judgment and vision. This may result in road accidents. They do not remove fatigue. They causes addiction.
- Amphetamine is used as spray or inhalant for relief of cold, asthma etc and are used among the 'dope test' drugs for athletes who use them to stimulate physical and psychological strength. They suppress hunger and are used to reduce weight.
- High does causes sleeplessness which may lead to mental confusion. Their use may produce after effect like nausea and vomiting.



Amphetamines

PSYCHEDELIC DRUGS (Psychotogenic drugs or hallucinogens)

- These are the drugs which induce behavioural abnormalities resembling psychosis by changing thoughts, feelings and perceptions without any actual sensory stimulus e.g. mescaline, psilocybine, LSD, phencyclidine, cannabis compounds.
- They causes optical or auditory hallucinations i.e. illusions, apparent perception of external objects or sounds not actually present.

(i) Mescaline

- It is a water soluble white powder alkaloid which is obtained from the crowns of cactus Lophophora williamsii

- Mescaline cause alteration in mood changes in perception, reveries, visual hallucinations, delusions (false belief), depersonalization (to lose the feeling of one's own reality) etc mescaline also increases temperature and blood pressure

(ii) Psilocybine / Psilocybin

- It is also called indocybin and is obtained from the fruiting bodies of the Mexican mushroom (fungus) Psilocybe Mexicana
- Psilocybin is used as a hallucinogenic agent. Mexican aborigines use psilocybin to induce trances

(iii) LSD

 LSD or D-Lysergic acid diethyamide-15 is crystalline amidated alkaloid derived from ergot, an extract of fruiting body of fungus Claviceps purpurea

- LSD is smoked by the addicts and causes nightmares, hallucination, floating sensation, chronic psychosis and severe damage to the central nervous system. It may cause unconsciousness and even death. LSD also brings about chromosomal and foetal abnormalities. Pathological condition caused by LSD abuse or by eating graxin affected by ergot is called ergotism. An LSD dependent person can be readily identified by incoherence in writing.
- LSD is used to induce contraction of involuntary uterine muscle, for checking haemorrhage and to alleviate migraine.

(iv) Hemp or cannabis compound or cannabinoid

- Four drugs, namely bhang, ganja, charas and marijuana, also called marihuana, are obtained from the dried leaves and flower of the hemp plants, cannabis sativa, commonly called bhang.
- The most active principle of hemp plant is tetrahydrocannabinol (THC). Hemp products may lead to heroin addiction
- The receptors for cannabinoids are mainly present in brain
- There are four types of hallucinogenic products.

- Bhang: It is fresh / dried leaves and flowering shoots of both male and female plant. Cannabis indica used as ingredient of a drink or other food article.
- Ganja / marijuana: It is dried unfertilized female inflorescence with stem of hemp plant cannabis sativa. Usually smoked in cigarettes and pipe.
- Charas / Hashish : It is resin collected from flowering tops of generally female plant cannabis sativa which is usually smoked with tobacco.
- Hash oil : It is a lipid soluble plant extract and highly concentrated. The active psychoactive substance is Δ9-tetrahydrocannabinoid or THC. Its concentration is 5mg/cigarette in case of marijuana, 0.5-6 in bhang, 8-12% by weight of hashish and 25-60% in hash oil. It is quickly absorbed in lungs and converted to psychedelic chemical, 11-hydrotetrahydro cannabinol in liver. Excretion occurs through faeces.
    - Use of bhang, ganja or charas leads to light headiness, pleasure, anxiety, fearfulness, suspiciousness, dry mouth, dilation of pupils, redness of eyes, increased appetite, impaired

depth perception, impaired driving ability, chest pain, slowing of time sense, delayed response, increased urination and hallucination.

- Regular use causes addiction. It results in behavior changes, reduced secretion of testosterone, loss of fertility, tachycardia, chronic cough and bronchitis.

(v) Datura and Belladona

- Seeds of Datura stramonium and aerial parts of Atropa belladona are misused for their hallucinogenic properties because of the presence of anticholinergic alkaloids atropine, hysocyamine and scopolamine. However, even in slight excess, they can cause death.

(vi) PCP / Phencylidine

- It is a veterinary medicine used in immobilizing large animal. PCP is available to addict as angle dust or white granular powder. A dose of 5mg causes excitement, analgesia, dysarthria (disorder of impaired motor coordination, flushing distortion of body image, feeing of estrangement, horizontal or vertical oscillation of eye ball, vasospasm of cerebral arteries, insomnia and chronic scizoprenia

(vii) Methylenedioxy methamphetamine (MDMA)

- MDMA has recently becomes popular with students under the name 'ecstasy' drug. MDMA has CNS-excitant and hallucinogenic properties. It seems to relax inhibitions and enhance communication.

REASONS FOR DRUG ABUSE

- Curiosity : Reference to drugs, smoking and alcohol in print media, electronic media, movies, internet and by addicts creates curiosity for having a personal experiences.
- Experimentation. There is natural tendency of every child to experiment
- Adventure and excitement : A child may go in for use of drug, smoking and alcoholic drink for the sake of adventure and excitement.
- Family set up: In certain families, use of alcohol, tobacco, sleeping pills and pain killers are common. It induces the youngsters to taste the same
- Group or peer pressure: Friends and peer groups often initiate some adolescents to drugs, alcohol and smoking as a defiance of authority and feeing of independence.
- Feeling of independence: Non –adjustment to social hierarchy may initiate some adolescents to drug, alcohol and smoking as defiance of authority and feeling of independence.
- Progressiveness: There is a false perception that taking of drugs, alcohol or smoking is assign of progressiveness in society.
- Stress: Adolescents are often under stress due to pressure from excelling in academic, sports hobbies and other activities. They fall in for addictive substances in order to overcome stress.
- Overcoming frustration and depression: Set back in academic, professional or family life may lead some person to use alcohol drugs or tobacco for overcoming frustration and depression.

- Unsupportive family structure : An unstable or unsupportive family structure often leads youngsters to drug, tobacco or alcohol addiction.

EARLY WARNING SIGNS OF ADDICTION

- Adolescents, hostelers, unemployed, failed and freshly employed persons are likely to start drug abuse. Family members, parents and teachers must keep an eye over their wards for
- Change in friend circle.
- Irregular completion of class-work.
- Poor performance in examination.
- Avoiding extracurricular activities
- Avoiding families duties and responsibilities.
- Physical changes like poor appetite, frequent sore throat, redness in eyes, weight loss, reduced physical activity.
- Behavioural changes like withdrawn nature mood alterations, unexpected anger and violence, telling lies, etc.
- Arrest by police or other legal problem.

EFFECTS/SYMPTOMS OF DRUG ABUSE

- Behavior : Addicts show reckless behavior. Vandalism and violence. Interest in work, commitment to duty and self confidence is lost.
- Body coordination : Neural and neuromuscular junctions are affected. As a result, coordination of body parts, working of nervous and muscular systems are influenced. Tremors become common.
- Impaired digestion: Addicts have not much interest in eating proper food. Addiction disturbed peristalsis and secretion of digestive enzymes.
- Therefore digestion is impaired.
- Nausea and vomiting : Disturbed digestive and nervous system leads to frequent nausea and vomiting.
- Damage to liver and kidney : Drugs, alcohol and tobacco affect liver and kidneys as they become involved in metabolism and elimination of their products. This is not their normal function. They, therefore, becomes damaged. The damaged liver undergoes cirrhosis.
- Disturbed respiratory system: There is irregularity in breathing due to effect of addictive substances on the respiratory centre of brain. The disturbance may lead to respiratory arrest.
- Sexual dysfunctions: Insufficiencies develop in reproductive system leading to impotency.
- Abnormal babies: Drug alcohol and tobacco addict mothers are liable to give birth to abnormal babies
- Infections: Taking of drugs intravenously may spread the serious infections like AIDS and hepatitis B due to sharing of infected needles and syringes. They also spread the infections to life partners since the infections may be sexually transmitted.

WITHDRAWAL SYMPTOMS

- Depressed mood : Cheer disappears. There is little interest in happening in the family or work place.
- Anxiety : An internal feeling of nervousness, fear, agitation and uncertainty occurs.
- Nervousness: There is feeling of nervousness courage and comfort are lacking.
- Restlessness: Inability to settle down due to feeling of uneasiness.
- Irritability : The person becomes angry over the slightest pretext.
- Insomnia : Sleeplessness or insomnia occurs.
- Increased appetite: Many persons develop a tendency to eat more.
- Dryness of throat : A feeling of dryness of thought occurs.
- Craving : There is a persistent internal urge to start taking addictive substances. The withdrawal symptoms are at their peak after 1-2 days of stoppage. They slowly begin to fade and most of them disappear 3-4 weeks after abstinence.

DEADDICTION

- It is treatment of drug habituation and carving for the abused drug. The various steps in the treatment of drug addiction are
- Pharmacotherapy
- Psychosocial therapy
- Health restoration.
- Psychological treatment.
- Prevention of relapse or re-addiction
- Pharmacotherapy: It comprises replacement of abusive drugs with less reinforcing and legally available ones.
- Psychosocial therapy : This includes rehabilitation of drug dependent in the form of counseling by relatives, friends and physicians
- Health restoration: Vitamin administration, proper nutrition, restoration of electrolyte balance, proper hydration are the measures aimed at restoring the health damaged by drugs.
- Psychological treatment : Reasons of taking drugs should be explored and sincere efforts should be made to eliminate them.

PREVENTATION AND CONTROL

- Discipline : Good nurturance with consistent discipline but without suffocating strictness reduces the risk of addictions
- Communication: The child must be able to communicate with the parents seeking clarification of all doubts and discussing problems that arise in studies or develop the class, with friends, siblings and others.
- Independent working : Give responsibility to the child for small task and allow him / her to perform independently
- Avoid undue pressure : No child should be asked to perform beyond threshold limits whether in studies, sports or extracurricular activities

- Education and counseling: Stresses, failures, disappointments and problems are part of life. A child has to be trained, educated and counseled to face them as and when they come.
- June 26 is observed as International Day Against Drug abuse and Illicit Trafficking

ALCOHOL ADDICTION

- Regular consumption of alcohol either in low concentration or in high concentration causes dependency on alcohol which is called alcoholism.
- Alcoholism is addiction, chronic overindulgence and dependence on alcoholic drinks which is often associated with defiant behavior.
- A person addicted to alcoholic drink is called alcoholic. Alcohol is chemically ethyl alcohol or ethanol (C_2H_5OH).

DEVELOPMENT OF DRINKING HABIT

- Gesture of defiance to elders, friends and life partners
- Feeling of independence
- Overcoming of frustration of failure
- Unhappy family life
- Curiosity
- Group pressure
- Pleasure or excitement
- Relief from pain
- Desire to do more work

METABOLISM OF ALCOHOL

- Alcohol is absorbed mainly in stomach and proximal part of intestine. Major metabolism occurs in liver
- 2-10 % is excreted through lungs, urine and sweat, 10% is metabolized over smooth endoplasmic reticulum. Rest is converted into acetaldehyde with the help of alcohol dehdrogenase.
- Acetaldehyde is oxidized in cytosol by acetyaldehyde dehydrogenase : It liberates heat. Hence alcohol drinks give them a feeling of flushing.

BLOOD ALCOHOL CONCENTRATION (BAC)

LOW BAC
Flushed face, feeling relaxed and high talkative, drunken behavior

RISING BAC
Effect on cerebellum resulting in clumsy gait, boisterous, loss of motor coordination so that driving ability is impaired

HIGH BAC

Blurred tunnel vision, slurred speech, aggressive behavior. Severe intoxication may result in unconsciousness or even coma

EFFECTS OF ALCOHOLISM

1. Gastric disorder : Alcoholism causes gastric ulcers and inflammations of gastric mucosa.
2. Depressant : Alcohol is generally depressant and reduces efficiency of all organs
3. Arterial dilation : The arteries undergoes dilation, becomes rigid and brittle.
4. Energy : Alcohol is oxidized to release energy which is dissipated from skin making face flushy.
5. Blood sugar : Alcohol addiction reduces level of blood sugar so that nutrient supply to different tissue become deficient.
6. Neuritis : There is inflammation of nerve axon.
7. Babies : Alcoholic mothers give birth to unhealthy, under weight and abnormal babies.
8. Kidneys : Urine is hyper osmotic. This disturbs kidney functions.
9. Breathing : Excess intake of alcohol slows down breathing.
10. Blood: RBC size increases but there is reduced number of erythrocytes, leucocytes and blood platelets.

PSYCHOLOGICAL EFFECTS

1. Amnesia: continuous use of alcohol leads to decreased mental functions. Forgetfulness increases.
2. Suspiciousness: Due to decreased vigour and increased forgetfulness, an alcoholic develops suspiciousness.
3. Accidents: Alcoholics often cause industrial and traffic accidents.

SOCIAL EFFECTS

1. Antisocial behavior: under the influence of alcohol, inhibitions, conscience and morals are often shed leading to all type of antisocial behavior.
2. Absenteeism: Addiction of alcohol leads to loss of interest in work.
3. Neglect of family : An alcoholic is self centered and stops bothering about other members of the family.

DEADDICTION

Alcohol dependence becomes both psychological and physiological. Therefore, withdrawal symptoms are quit apparent -insomnia, anxiety, tremor, irritability, gastric problems. In some cases the symptoms are more sever-hallucinations, confusion and seizures.

1. For deaddiction, psychotherapy or counseling is very important.
2. Patient is provided with thiamine rich diet and brain depressants like benzodiazepines.
3. Patients are also given disulfiram or carbimide. It causes violent reaction if alcohol is taken. The phenomenon is called aversion treatment.