
On
Board!
BOOKS

On Board! BOOKS

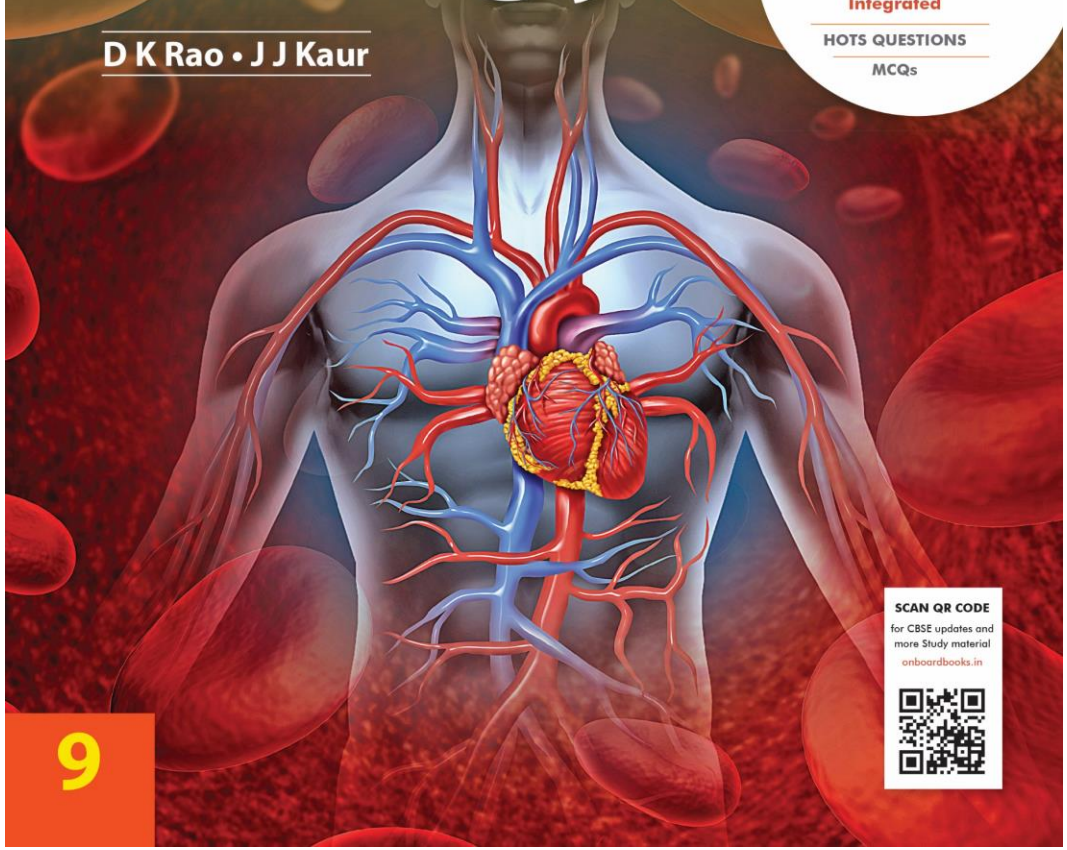
As per the guidelines of NEP 2020

Living Science
Biology

D K Rao • J J Kaur

Includes
COMPETENCY-BASED QUESTIONS (CBQs)
- ✓ Assertion-Reasoning
- ✓ Source-based/Case-based/ Passage-based/ Integrated

HOTS QUESTIONS
MCQs



SCAN QR CODE
for CBSE updates and more Study material
onboardbooks.in

9

CBSE
Living Science
Biology

Class 9

Chapter 4 Why Do We Fall Ill?

LEARNING OBJECTIVES

Health and Its Failure

- ❖ Personal and community issues affecting health
- ❖ Distinction between being "Healthy" and "Disease Free"

Disease and its Cause

- ❖ Acute and chronic diseases
- ❖ Causes of Diseases
- ❖ Types of Diseases
- ❖ Infectious Diseases
- ❖ Mode of Spread of Infectious Diseases

Aids – A Disease Caused By Direct Contact

- ❖ Organ-specific and tissue-specific manifestations
- ❖ Principles of Treatment
- ❖ Principles of Prevention

What is the significance of health?

Health is a state of being well enough to function properly, physically, mentally and socially. According to WHO health is a state of complete physical, mental and social well-being and not merely an absence of disease or infirmity.

Physical, Mental and Social Health

❖ **Physical health:** It is the normal state of structure and proper functioning of the body parts. It can be assessed by different tests.

❖ **Mental health:** It is a state of normal mental satisfaction, which is achieved when the individual maintains a balance with its environment. A mentally sound individual can contribute to his or her society or community in a better way. Mental health cannot be measured.

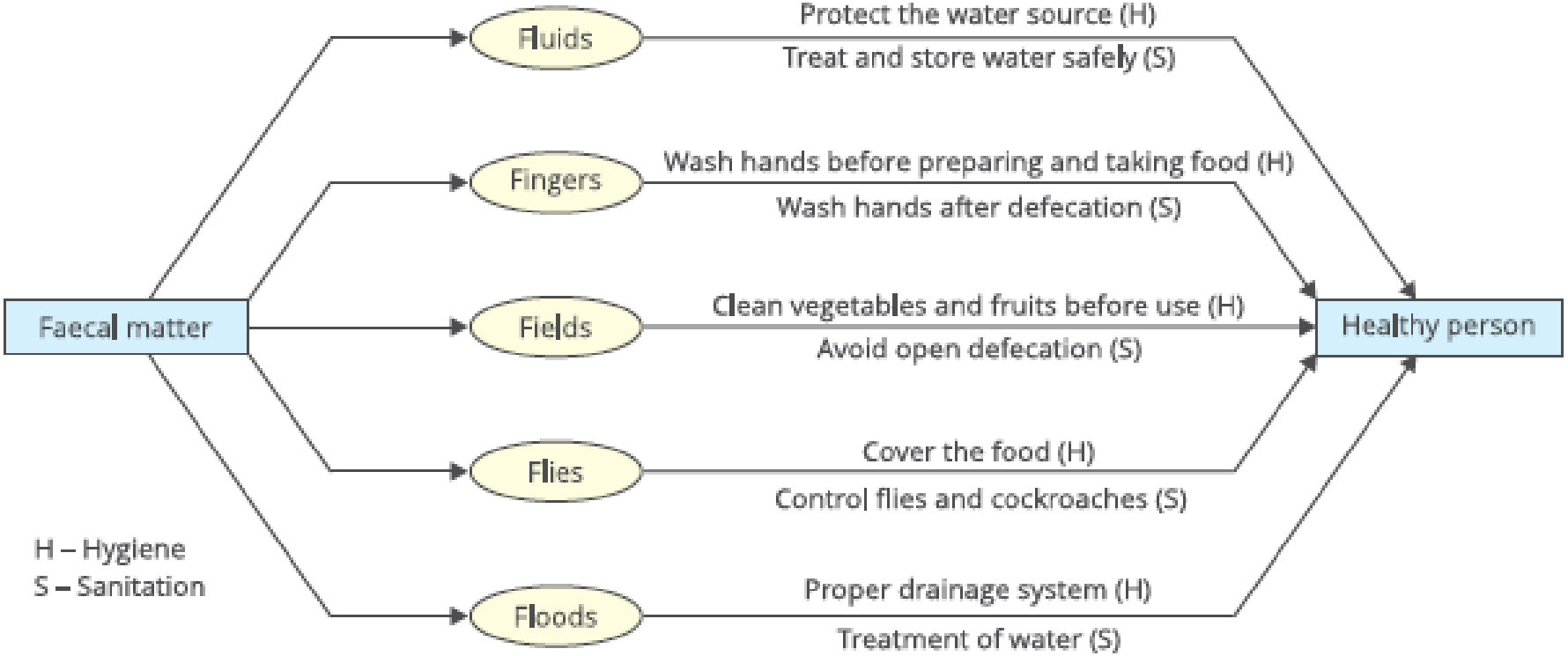
❖ **Social health:** It is the happiness of an individual at home, workplace and society. It is the social well-being of an individual. It cannot be measured.

Personal and community issues affecting health

❖ Our immediate environment and society in which we live play a crucial role in deciding our health.
❖ Our social environment is an important factor in deciding our individual health.
❖ Public cleanliness is important for good health.
❖ Good economic conditions and availability of jobs to help in buying food and medicines and other articles is also necessary for healthy living.
❖ Social equality and harmony are necessary for individual health.

The Five F's

The pathogens in faeces pass from one person to another via the faecal-oral route of transmission. The major causes of faecal-oral disease transmission are lack of adequate sanitation and poor hygiene practices. These causes are summarized and known as the **five F's**. The five F's include – fingers, flies fluids, fields and floods. Diseases caused by faecal-oral transmission are cholera, diarrhoea, typhoid, hepatitis and polio.



Distinction between being “Healthy” and “Disease Free”

Any physical or functional change from the normal state that causes discomfort or disability or impairs the health of a person may be called a disease; or Disorder in the physical, physiological or social state of a person caused either due to nutritional deficiency, hormonal change, pathogen or any other reason is called a disease.

Not suffering from a disease does not mean being healthy. One can be in poor health without suffering from any identifiable disease.

Disease and its Cause

Any inappropriate behaviour of an organ or any external sign of problems in the body is known as symptom of that disease. On the basis of symptoms, signs of diseases can be found out by physicians. The signs of disease give some more indication of a particular disease. On the basis of the signs, laboratory tests can be conducted to diagnose the exact disease.

Acute and Chronic Diseases

The diseases which last for very short periods of time are called acute diseases. The symptoms of these diseases are visible very quickly in the body. The diseases that last for a long time, even as much as a lifetime, are called chronic diseases.

Causes of Diseases

There are many levels of causes of a disease, such as:

Level one – Immediate or primary causes

Infection by microorganisms: Some diseases are caused due to infection by microorganisms such as bacteria, virus, fungi and protozoa.

Level two – Contributory or secondary causes

Unclean environment: The microorganisms grow well in an unclean environment. Unclean environment includes polluted air, polluted drinking water, etc.

Deficiency of nutrients in diet: Proper nutrition is very essential for good health. A person with lack of nutrient in his or her diet is more prone to diseases.

Genetic factors: Sometimes, genetic differences also cause diseases. Due to genetic disorders, body's immunity to fight diseases is reduced. As a result, the person becomes prone to diseases. In addition, genetic defects cause some abnormalities in a person leading to physiological and morphological malformations in the body.

Level three – Lack of public services or tertiary causes

These causes include those caused due to lack of public services.

Had there been good economic conditions of a person, there would not have been deficiency of nutrients in diet. Similarly, if proper public services were available, the environment would have been clean and diseases would not have been caused.

Types of Diseases

Based on the time of their occurrence – whether from birth or after birth, diseases are broadly grouped into two categories:

Congenital diseases

Those diseases which are present since birth are called congenital diseases. Such diseases are caused due to a genetic abnormality or malfunctioning of any organ or organ system. These diseases may be passed on from one generation to another.

Acquired diseases

Those diseases which develop after birth are called acquired diseases. These can be broadly classified into two types:

Communicable (infectious) diseases

These diseases spread from an unhealthy or infected person to a healthy person. They are caused by microorganisms (pathogens) such as viruses, bacteria, fungi, protozoa or helminths (worms).

The causative organism of the disease can spread from one person to another through contact, water, air, food, etc. For example, malaria and dengue.

Non-communicable (non-infectious) diseases

These diseases do not spread from an infected person to a healthy person. They are caused due to some specific factors such as malfunctioning of some vital organs and deficiency of nutrients. For example, diabetes, arthritis, heart diseases and cancer. Non-communicable diseases can be further divided into:

Degenerative diseases

These diseases are caused due to malfunctioning of important body organs. For example, osteoporosis, kidney failure, myopia and arthritis.

Deficiency diseases

These diseases are caused by the deficiency of nutrients in our diet like proteins, minerals, vitamins, etc. For example, marasmus, kwashiorkor, anaemia, goitre, beriberi and pellagra.

Kwashiorkor affected child | Healthy child | Marasmus affected child

Allergies

Allergy is caused due to the hypersensitivity of the body to foreign substances like pollen grains, dust, silk, nylon, egg, fish and certain drugs.

The substances due to which allergy is caused are called allergens. For example, asthma, bronchitis and skin allergy.

Allergy causes redness of the skin.

Infectious Diseases

Infectious agents

Infectious diseases are caused by a variety of microorganisms such as virus, bacteria, fungi and protozoans. Some multicellular organisms like worms also cause diseases.

SAARS Virus

Diseases caused by viruses: Common cold, influenza, dengue fever, severe acute respiratory syndrome (SARS), mumps, poliomyelitis, coronavirus disease (COVID-19), chicken pox, small pox, Hepatitis B, swine flu and acquired immuno deficiency syndrome (AIDS) are some diseases caused by viral infections.

Diseases caused by bacteria: Typhoid fever, cholera, tuberculosis, acne, syphilis, tetanus, whooping cough, gonorrhoea and anthrax are some diseases caused by bacterial infections.

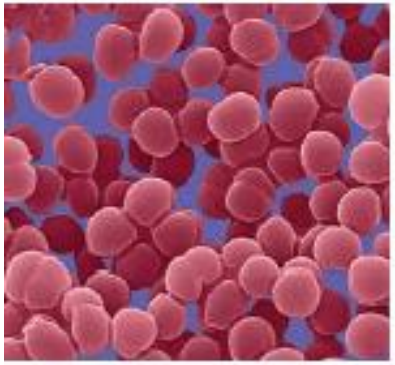
Vibrio cholerae *Salmonella typhi* *Mycobacterium tuberculosis*

Causative agents of cholera, typhoid and tuberculosis.

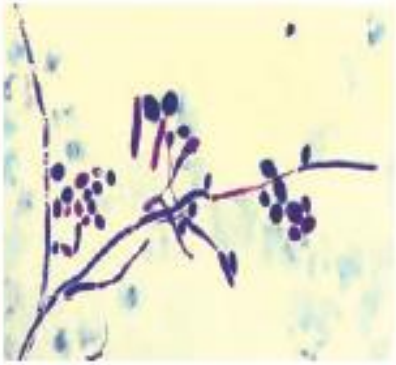
Diseases caused by fungi: Fungi cause many skin infections in humans. Some other diseases caused by fungi include, ringworm, Athlete's foot, thrush disease, etc.

Diseases caused by protozoans: Malaria, amoebiasis, sleeping sickness and kala-azar are some diseases caused by protozoans in humans. Malaria spreads by female *Anopheles* mosquito.

Diseases caused by worms: The common example is intestinal infections, ascariasis, caused by *Ascaris* in humans. In addition, filariasis and elephantiasis are also caused by some worms.



a. *Staphylococci*, the bacteria which causes acne.



b. *Candida albicans*, a saprophytic fungi, causes thrush disease.

c. *Trypanosoma*, the protozoan that causes sleeping sickness.

d. *Leishmania*, the oval-shaped protozoan that causes kala-azar.

Some causative agents of infectious diseases

Mode of Spread of Infectious Diseases

Infectious (communicable) diseases spread from an infected person to a healthy person in two ways – direct transmission and indirect transmission.

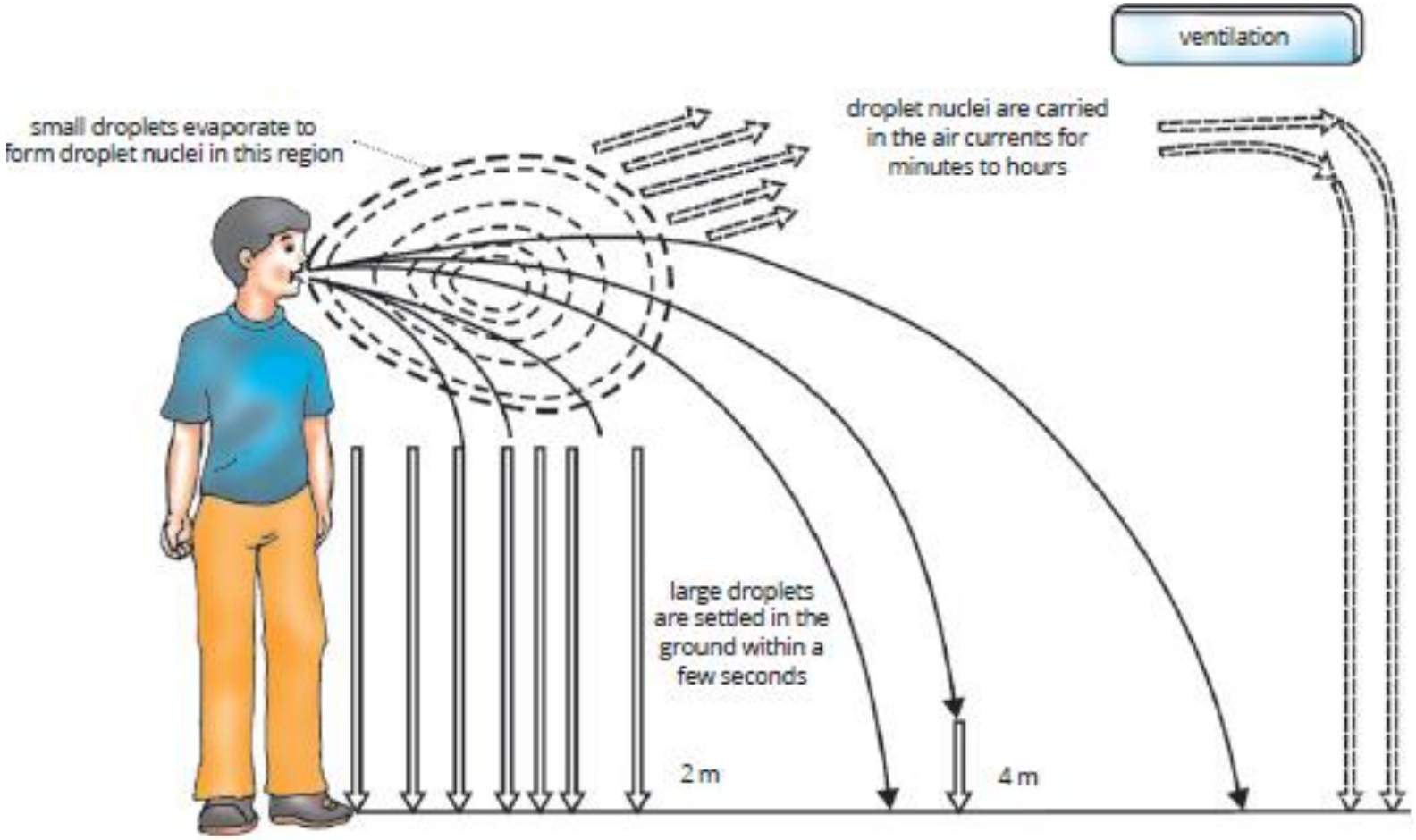
Direct transmission

The pathogens of certain diseases react and infect a healthy person directly without an intermediate agent. It can take place by various means.

Direct contact between the infected person and the healthy person: Diseases like smallpox, chicken-pox, syphilis and gonorrhoea spread through direct contact. Sexual act is one such direct contact through which syphilis and AIDS are transmitted.

Droplet infection: Droplets are airborne. The infected person throws out tiny droplets of mucus by coughing, sneezing, spitting or even talking. These droplets may contain pathogens. By inhaling the air containing the droplets, a healthy person may get the infection.

Diseases like common cold, pneumonia, influenza, measles, mumps and tuberculosis spread by droplet infection. Since the larger droplets take a few seconds to a few minutes to reach a nearby person, we should cover our mouth while sneezing or coughing.



Air transmitted droplet infection – overcrowded and poorly ventilated housing is a major factor in the spread of airborne infections.

Contact with soil contaminated with disease-causing viruses, bacteria, etc. The bacteria responsible for tetanus, *Clostridium tetani*, enters the human body from the soil.

Animal bite: Viruses of rabies are introduced through the wound caused by the bite of rabid animals, especially dogs. The virus is present in the saliva of the rabid animal.

Through placental transmission which may pass from the mother's body to the foetus through placenta. For example, virus of measles and AIDS virus.

Indirect transmission

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

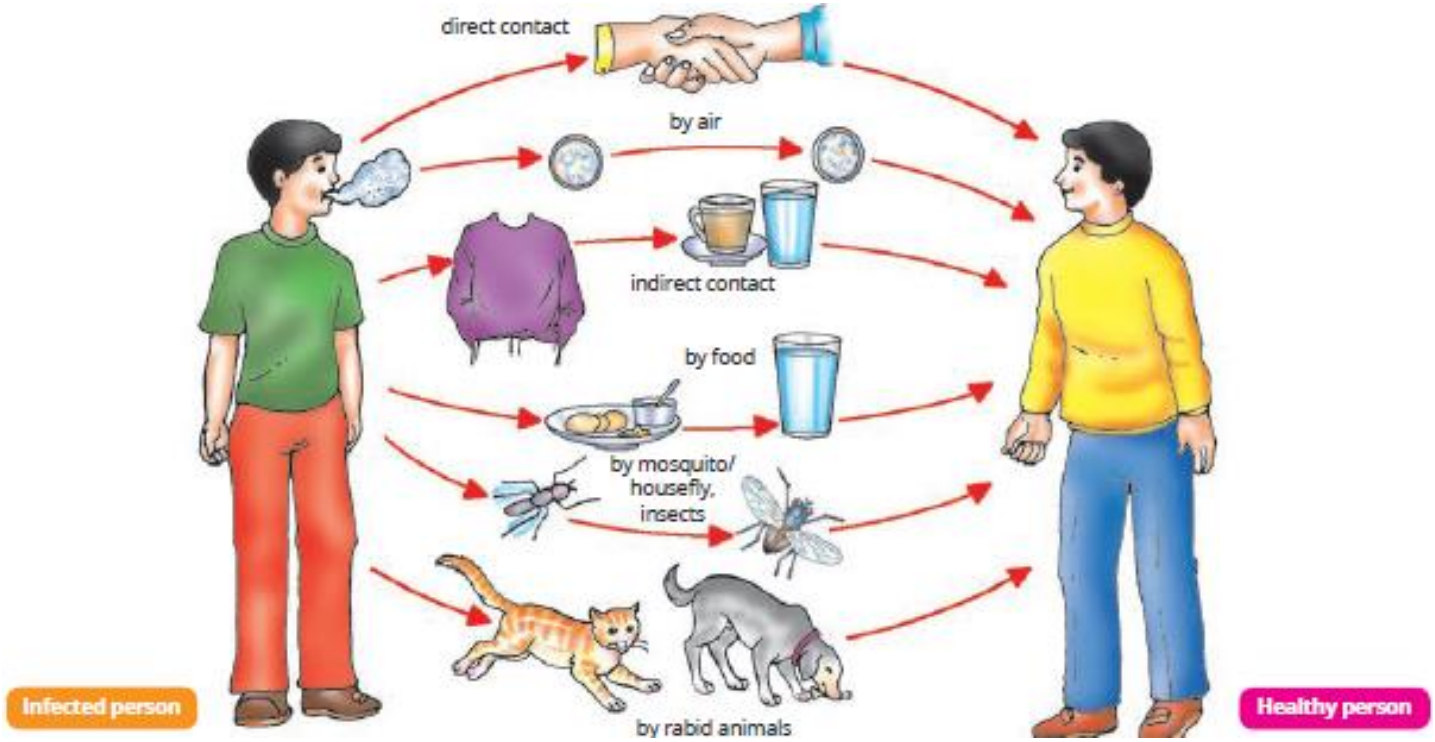
By vectors: Houseflies, mosquitoes and cockroaches which take up the pathogen from the reservoir of infection pass it to healthy persons. These are the intermediaries and are called as **vectors**.

Airborne: The pathogens may reach the humans with air and dust. The epidemic typhus spreads by inhalation of dried faeces of infected lice.

Waterborne: Diseases also spread through water contaminated with microbes. Cholera, Hepatitis B and diarrhoea spread through such mode.

Object-borne or Fomite-borne: Many diseases are transmitted through the use of contaminated articles, such as handkerchiefs, towels, utensils and toys.

Dirty hands and fingers are also the sources of infection for various digestive and respiratory diseases.



Common ways of transmission of diseases

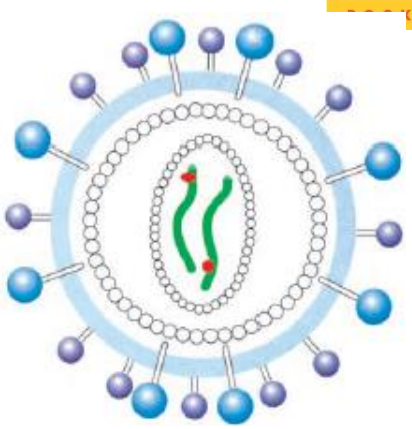
AIDS – A Disease Caused by Direct Contact

AIDS (Acquired Immuno Deficiency Syndrome) is a viral disease caused by HIV (Human Immunodeficiency Virus). HIV attacks the white blood corpuscles (WBCs) of blood and reduces the immunity power of the person. Such a person is prone to various diseases.

How does AIDS spread?

AIDS spreads through:

- Sexual contact with an infected person.
- Transfusion of blood infected with HIV.
- Use of HIV infected needle for injections.
- HIV infected mother to foetus (then to newly born infants).



Structure of HIV

Prevention of AIDS

- People should be educated about AIDS.
- Only disposable needles and syringes should be used.
- Routine screening should be done of blood donors and organ donors.
- Blood must be screened for HIV.

Principles of Treatment

There are two principles or methods of treatment for an infectious disease –

By reducing the effects of the disease

For this, the treatment is provided to reduce the symptoms. The symptoms are usually because of inflammation. Thus, medicines can be given to patient to bring down fever, reduce pain or loose motions. However, the treatment of symptoms does not make the microbe ineffective. It can only provide temporary relief from symptoms without curing the disease.

By killing the cause of the disease

Microbes can be killed by taking medicines which affect the biochemical processes of a particular group of microbes such as virus, bacteria, fungi, protozoa, etc. Usually antibiotics are the medicines that are administered in the first phase to block the biochemical pathways.

Principles of Prevention

General way of preventing infectious diseases

Preventing exposure to infectious microbes

❖ To prevent exposure to **airborne microbes**, we can provide healthy and hygienic living conditions which are not overcrowded.

❖ For **waterborne microbes**, we can prevent exposure by providing clean and safe drinking water.

❖ ❖For **vector-borne infections**, we can provide clean environment so that these disease carrying vectors do not flourish there. Thus, public hygiene is a basic key to prevention of infectious diseases.

Providing proper and sufficient food

Functioning of immune system is dependent upon the type of nourishment we receive. Thus, providing proper and sufficient food is very necessary for prevention of a disease.

Specific way of preventing infectious disease

Immunity is the body's ability to fight off foreign substances, viruses or bacteria by producing antibodies or cells that can kill or neutralize these foreign substances or cells

Immunization

Immunization is the process of developing immunity or resistance against a particular pathogen.

Vaccination

Vaccination is a term coined by **Edward Jenner**. It is the process of administering vaccine into the body for developing resistance against a particular disease. A vaccine is a biological preparation of dead or weakened microbe that improves immunity to a particular disease.

Note: Refer to Table 4.4 for Important vaccines for infants and children

SUMMARY...

❖ Health is a state of complete physical, mental and social well-being and not merely an absence of disease or infirmity.

❖A disease is any physical or functional change from the normal state that causes discomfort, disability or impairs the health of a person.

❖Diseases may be classified as infectious and non-infectious depending upon their causes, or as acute and chronic depending upon their duration.

❖Diseases which spread from an infected person to a healthy person are known as infectious diseases.

❖Diseases which do not spread from an infected person to a healthy person are known as non-infectious diseases.

❖Diseases which last for a very short periods of time are called acute diseases.

❖Diseases that last for a long time, even as much as lifetime, are called chronic diseases.

- All diseases have some causes. These causes may be immediate causes (which directly affect the sufferer) or contributory causes (which indirectly contribute to the disease). Most diseases have many causes rather than only one cause.
- Proper knowledge of the category of microorganism causing a disease is necessary for prevention and treatment of a disease.
- Infectious agents may spread through air, water, physical contact or vectors.
- There are two ways of prevention of a disease – general and specific. General way of prevention of a disease includes preventing exposure to infectious microbes and providing proper and sufficient food. Specific way of prevention of a disease includes immunization.
- Immunization is the process of developing immunity or resistance against a particular pathogen.
- A vaccine is a biological preparation of dead or weakened microbe that improves immunity to a particular disease.

THANK YOU