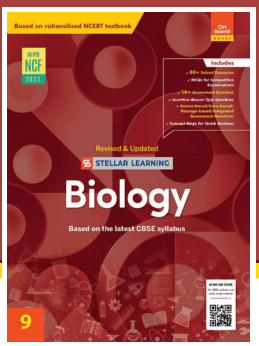


READING MATERIAL

Why do We Fall Ill?

Understanding health and diseases is a very complex issue. They have many interconnected causes. We already know about cells and the different activities carried out by the different types of cells. Our body will not be able to function properly unless all these interconnected activities are regulated and our body receives adequate raw materials necessary to generate energy. These raw materials are supplied in the form of nutrients in our food from outside the body. Thus, food is necessary for proper functioning of cells and tissues. In this chapter, we shall learn about health and diseases.

Knowledge Byte

Antibiotic Resistant Bacteria

Antibiotic resistance is a type of antimicrobial resistance, by virtue of which, bacteria become resistant to antibiotics. These bacteria possess the ability to survive and multiply in the presence of antibiotics. The major factors contributing to resistance are natural defence mechanisms in certain types of bacteria, genetic mutation or by horizontal gene transfer. Overuse of antibiotics, poor infection prevention and control are some of the factors which accelerate antibiotic resistance. These bacteria cause serious diseases and pose a major public health problem. Antibiotic resistance can be prevented by minimizing unnecessary consumption of antibiotics, completing the entire course of the prescribed antibiotic and practicing good hygiene.

Knowledge Digest 1

Health and Its Failure

What is the Significance of Health?

World Health Organisation (WHO) has defined health as "**Health is a state of complete physical, mental and social well-being and not merely an absence of disease or infirmity.**"

- **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 the society in which we live, play a crucial role in deciding our health.** An imbalance in our physical environment like natural calamity such as a cyclone or a drought or an earthquake create risk to health.
- Our **social environment is an important factor in deciding our individual health**.
- **Public cleanliness is important for good health.** Dirty and unhygienic surrounding due to improper garbage disposal, stagnation of water in drains, breeding of mosquitoes and flies will lead to poor health.
- **Good economic conditions and availability of jobs** to help in buying food and medicines and other articles is also necessary for a healthy living.
- **Social equality and harmony are necessary for individual health.** This is because in order to be truly healthy, we need to be happy. Therefore, we should maintain a harmonious relationship with each other and treat everybody equally.

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 (Fig. 1). Diseases caused by faecal-oral transmission are **cholera**, **diarrhoea**, **typhoid**, **hepatitis** and **polio**.

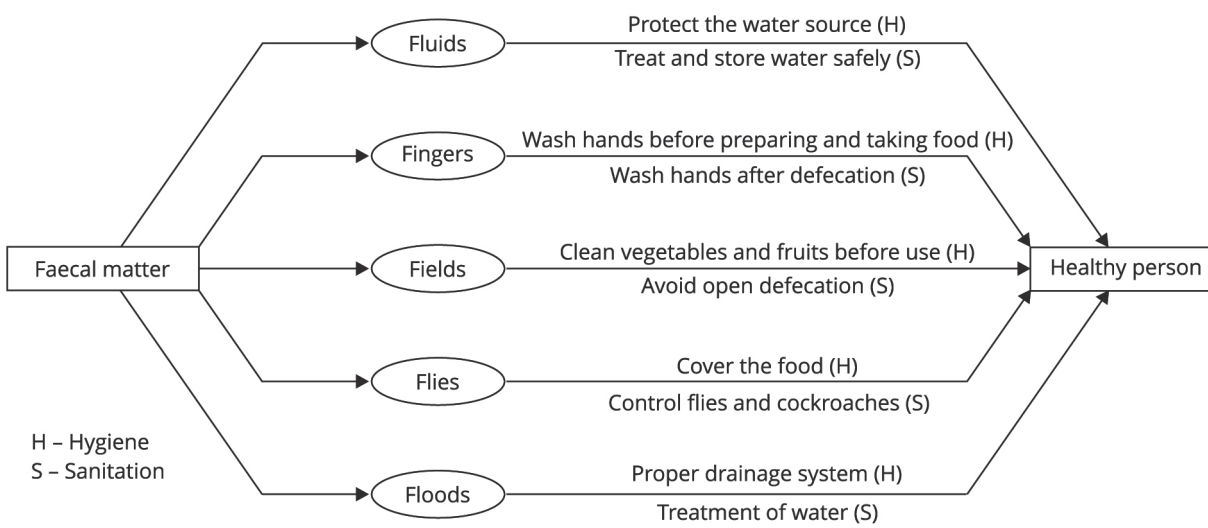


Fig. 1 The five F's: Prevention of transmission of diseases by maintaining sanitation and hygiene.

Disease and Its Cause

Distinction Between Being "Healthy" and "Disease Free"

The term disease has come from two words – *des* meaning 'away' and *aise* meaning 'ease or comfort'. Thus, the term disease literally means away from ease or simply uncomfortable.

Definitions of diseases are given as follows:

- **Any physical or functional change from the normal state that causes discomfort or disability or impairs the health of a person may be called 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. On the other hand, when we think of disease, we think of individual suffering due to a particular discomfort.

The differences between the two terms, i.e. being healthy and disease-free are given in Table 1.

Table 1 Differences between being healthy and disease-free

Being healthy	Disease-free
State of physical, mental and social well-being.	State of body without having any discomfort or symptoms of a disease.
A healthy person is always energetic and disease free.	A disease free person may not necessarily be healthy or energetic.

Symptoms or Signs of a Disease

Any inappropriate behaviour of an organ or any external signs of problem in the body are known as symptoms of that disease. We know that similar tissues in our body are grouped together to form organs and organ systems. Each organ system has a specific organ for a specific function. For example, our circulatory system consists of heart, veins and arteries. Heart is necessary for pumping blood that is transported to and from our body organs through arteries and veins. Similarly, our digestive system consists of stomach, intestine and digestive glands. The stomach helps to digest food by mixing digestive enzymes and bile juices while absorption of nutrients takes place in intestine. Similarly, our body has the musculoskeletal (muscular and skeletal) system which is made up of muscles and bones. This system holds the body parts together and helps in the body movements.

However, in case of a disease, usually functioning or sometimes appearance of one or more systems of the body changes for worse. These changes in the functioning or appearance of organ systems will show symptoms and the signs of the disease.

Symptoms indicate that there is something wrong with the body but they do not indicate what disease it may be. It may include headache, cough and loose-motions. For example, a headache may be due to stress, or lack of sleep or worse, meningitis.

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. For example, in case of persistent high fever, blood tests can be conducted or in case of persistent pain in leg, X-ray and vitamin D/calcium tests can be conducted.

Acute and Chronic Diseases

There are some diseases such as fever, which last for a very short time. On the other hand, there are some diseases such as arthritis and blood pressure that last for a long time. Thus, time duration determines how we perceive the disease. On the basis of duration of occurrence, the diseases can be classified into two types – acute and chronic.

Acute 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.

For example, common cold, dysentery, typhoid and cholera.

Chronic Diseases

The diseases that last for a long time, even as much as a lifetime, are called chronic diseases. The symptoms of the disease get visible after a period of time. For example, tuberculosis, elephantiasis, diabetes, arthritis and blood pressure.

Chronic Diseases and Poor Health

Acute and chronic diseases have different effects on our health. We know that proper functioning of all the body parts is necessary for general good health. Therefore, any disease which causes poor functioning of organ system would affect our general health also. However, since acute diseases last for very short periods of time, they will not have enough time to cause major effects on general health. On the other hand, a chronic disease will have major effects on general health since it lasts for long periods of time. For example, we often suffer from cough and cold or headache. However, we get well soon within a week or so and it does not affect our health. On the other hand, if we suffer from a chronic disease like tuberculosis, then our lungs get affected. Soon, we lose weight, become short of breath and feel tired regularly.

Since chronic diseases result into a prolonged poor general health, they have very drastic long term effects on people's health as compared to acute diseases.

Causes of 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. 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. For example, common cold is caused by virus. Thus, infection by virus becomes the immediate cause of common cold.

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. Persons with lack of nutrients in their diet are weak and more prone to diseases. For example, diseases like marasmus, anaemia and goitre are caused due to the lack of proper nutrition.
- **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.

The contributory causes cannot operate in isolation. They need immediate cause for a disease to be caused.

Level Three – Lack of Public Services or Tertiary Causes

These include those diseases 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
- Acquired diseases

Congenital Diseases

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.

Examples – Down syndrome, cystic fibrosis, cerebral palsy and fragile X syndrome.

Acquired Diseases

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

- Communicable or infectious diseases
- Non-communicable or non-infectious diseases

Communicable (Infectious) Diseases

Diseases which spread from an unhealthy or infected person to a healthy person are called communicable or infectious diseases. Such diseases are caused by microorganisms like viruses, bacteria, fungi, protozoa or helminthes. The causative organisms can spread from one infected person to another through contact. These diseases also spread through contaminated water, air and food.

Examples – Malaria and dengue.

Non-communicable (Non-infectious) Diseases

Diseases which do not spread from an infected person to a healthy person are called non-communicable or non-infectious diseases. Such diseases are caused due to some specific factors such as malfunctioning of some vital organs and deficiency of nutrients.

Examples – Diabetes, arthritis, heart diseases and cancer.

The differences between infectious and non-infectious diseases are given in Table 2.

Non-communicable disease can be further divided into:

Degenerative Diseases

These diseases are caused due to malfunctioning of important body organs.

Examples – Osteoporosis, kidney failure, myopia and arthritis.

Study Tip

Peptic Ulcers and Nobel Prize

Peptic ulcers cause acidity related pain and bleeding in the stomach. Two Australian scientists Robin Warren (born 1937) and Barry Marshall (born 1951), made a discovery that a bacterium, *Helicobacter pylori*, was responsible for peptic ulcers. Robin Warren discovered these small curved bacteria in the lower part of the stomach in many patients. He also noticed that mostly signs of inflammation were present around these bacteria. Barry Marshall, a young clinical fellow, succeeded in cultivating these bacteria from the patients.

Further, Marshall and Warren showed that patients could be cured of peptic ulcers if these bacteria could be killed off from the stomach. Because of their discovery, peptic ulcer is no longer a chronic disease now and can be treated in a short period of time by antibiotics.

Marshall and Warren received the Nobel Prize for physiology and medicine in 2005 for this pioneering work.

Table 2 Differences between infectious and non-infectious diseases

Infectious diseases	Non-infectious diseases
These are caused by some biological agents or pathogens, such as viruses, bacteria, protozoans, helminths (worms) and fungi.	These diseases can be due to some specific factors, such as malfunctioning of some vital organs and deficiency of nutrients.
These can spread from one person to another through contact, water, air, food, etc.	These diseases do not spread from one person to another by contact, water, air, food, etc.
These diseases are the concern of society as these are related to community health.	These diseases are the concern of the individual only.

Deficiency Diseases

These diseases are caused by the deficiency of nutrients in our diet like proteins, minerals and vitamins.

Examples – Marasmus, kwashiorkor, anaemia, goitre, beriberi and pellagra.

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.**

Examples – Asthma, bronchitis and skin allergy.

Solved Examples

Very Short Answer Type Questions

1. What is meant by the term health?

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

2. What are the two types of acquired diseases?

Ans. Infectious and non-infectious diseases.

3. Give an example of each type of disease mentioned here.

(a) Congenital disease

(b) Degenerative disease

Ans. (a) Cystic fibrosis

(b) Kidney failure

4. What are infectious diseases? Give any two examples.

Ans. Diseases which spread from an unhealthy or infected person to a healthy person are known as infectious diseases. These are caused by a variety of microorganisms like virus, bacteria, fungi and protozoa.

Examples: Common cold, tuberculosis

5. Write any two conditions essential for being free of diseases.

Ans. Two conditions essential for being free of diseases are:

(i) Person should maintain personal and community hygiene.

(ii) Person should take balanced diet.

6. How does our immediate environment influence our health?

Ans. Our immediate environment plays a crucial role in deciding our health. Dirty and unhygienic surrounding due to improper garbage disposal, stagnation of water in drains, breeding of mosquitoes and flies will lead to poor health.

Short Answer Type Questions

7. What are the various levels of causes of a disease?

Ans. Various levels of causes of a disease are:

(i) **Level One – Immediate or Primary Causes:** Infection by microorganisms which causes disease is the immediate cause of a diseases.

(ii) **Level Two – Contributory or Secondary Causes:** Unclean environment, deficiency of nutrients in diet are the contributory causes of a disease. Contributory causes cannot cause a disease without immediate cause.

(iii) **Level Three – Lack of Public Services:** These services resulting in unclean environment is the tertiary cause of a disease.

8. (a) Differentiate between symptoms and signs of a disease.

(b) What are acute diseases? How do they differ from chronic diseases?

Ans. (a)

Symptoms	Signs
A symptom is a change in normal functioning of the body which is felt by the patient.	A sign of a disease is a change in bodily function or structure which can be observed by a physician.
Symptoms are subjective. They are not physically visible and cannot be verified.	Signs are objective, they are visible and can be verified.
Examples: Headache, Fever, Nausea, Sore throat.	Examples: Rashes, Yellowing of skin, sticky red eyes.

(b) Diseases which last for very short periods of time are called acute diseases.

Chronic diseases, unlike acute diseases, last for a longer time, even as much as the entire lifetime. Moreover, the symptoms of chronic diseases get visible after a period of time. The symptoms are visible very quickly in the body in case of acute diseases.

Long Answer Type Question

9. (a) Write any two differences between infectious and non-infectious diseases.

(b) Do the terms 'good health' and 'being free from diseases' have the same meaning? How?

(c) Explain the relationship between poor economy and disease.

Ans. (a)

Infectious diseases	Non-infectious diseases
These are caused by some biological agents or pathogenic factors, such as bacteria, protozoans, helminths or fungi.	These diseases can be due to some specific malfunctioning of some vital organs and deficiency of nutrients.
These can spread from one individual to another.	These diseases do not spread from one individual to another.

(b) No, 'good health' and 'being free from diseases' are not the same. One can be in poor health, without suffering from any identifiable disease.

(c) For good health, proper and sufficient food is necessary. This food can be obtained only if one has sufficient money. Good economic conditions in the society will make the population of a nation healthy. If the economy is poor, due to insufficient food, deficiency diseases will prevail. Also weak immune system will make one susceptible to several infectious diseases.

Check Your Progress 1

Multiple-Choice Questions

1. In which of the following diseases, do you think the long term effects on your health are likely to be the most unpleasant?

(a) Diarrhoea (b) Acne

(c) Jaundice (d) Headache

2. Which of the following is a non-communicable disease?

(a) Malaria (b) Dengue

(c) Beriberi (d) Tuberculosis

3. Which of the following can be the sign of a disease?

(a) Headache (b) Fever

(c) Rashes (d) Nausea

4. What kind of disease is arthritis?

(a) Communicable (b) Chronic

(c) Infectious (d) Acute

Very Short Answer Type Questions

5. Name two non-communicable diseases.

6. What is symptom of a disease?

7. The immediate causes of many diseases are not infectious. Name any two such diseases.

8. Name the type of diseases which

(a) do not spread from one person to another.

(b) lasts for a very long period of time, even for lifetime.

9. Differentiate between acute and chronic diseases.

10. "Being disease free is not the same as being healthy." Justify this statement by giving an example.

11. How is personal health and community health connected?

12. State any two differences between immediate and contributory causes of a disease.

Short Answer Type Questions

13. What is health? Discuss the importance of good health.

14. (a) Give one example each of acute and chronic diseases.

(b) Mention any two reasons for diseases caused in a baby.

15. (a) Which of the following will cause major ill effects on general health – encephalitis, cold and cough, diaarrhoea, tuberculosis? Why?

(b) Explain how individual health depends upon social and mental well-being.

Long Answer Type Question

16. (a) List the following diseases into communicable and non-communicable diseases:

(i) cancer (ii) high blood pressure (iii) common cold (iv) diabetes (v) tuberculosis (vi) night blindness (vii) typhoid (viii) dengue (ix) typhoid

(b) Write two differences between communicable and non-communicable diseases.

(c) Why infectious diseases are also called communicable diseases?

Knowledge Digest 2

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.

- **Diseases Caused by Viruses:** Common cold, influenza, dengue fever, severe acute respiratory syndrome (SARS), mumps, poliomyelitis, 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, botulism, gonorrhoea and anthrax are some diseases caused by bacterial infections.
- **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 infection, ascariasis, caused by *Ascaris* in humans. In addition, filariasis and elephantiasis are also caused by some worms.

Proper knowledge of the category of microorganism causing a disease is necessary for the prevention and treatment of that disease.

The most common diseases caused by different types of microorganisms are summarised in Table 3.

Members of each group of viruses, bacteria and other microorganisms have many biological characteristics in common.

- All viruses live inside the host cells whereas bacteria very rarely live inside cells. They rather live freely in environment.
- Taxonomically, all members of group bacteria are very closely related to each other than to viruses. Thus, many life processes are similar in the members belonging to group bacteria, but not shared with members belonging to group viruses.
- All viruses, bacteria and fungi multiply very fast while worms multiply very slowly.

Thus, based on differences in the characteristics amongst the members of different groups and similarities amongst the members of same group, we can design the control measures against them. For example, a drug which blocks life processes in one member of a group will be generally effective against the other members of the same group. However, it will not be effective against the members of the other group.

Antibiotics are chemicals produced by microbes which kill or prevent the growth of other microbes. These are drugs that commonly block biochemical pathways in bacteria. Many bacteria make a cell wall around themselves for protection. Penicillin is an antibiotic that blocks the biochemical pathways by which bacteria build a cell wall around them. As a result, the bacteria die. Since human cells do not have a cell wall around them, therefore, penicillin will only affect bacteria and not human cells. As a result, penicillin will work against the species of bacteria that build cell wall around them.

Table 3 Some common diseases caused by pathogens

Types of pathogen	Diseases caused in living organisms
Virus	Common cold, poliomyelitis, influenza, SARS, AIDS, dengue fever, mumps, smallpox, chickenpox, measles
Bacteria	Typhoid, cholera, tuberculosis, tetanus, syphilis, gonorrhoea, diphtheria, pneumonia
Fungi	Skin infections, ringworm, athlete's foot
Protozoa	Malaria, amoebiasis (amoebic dysentery), kala-azar, trypanosomiasis
Worms	Taeniasis (tapeworm infection), elephantiasis (pinworm infection), ascariasis (roundworm infection)

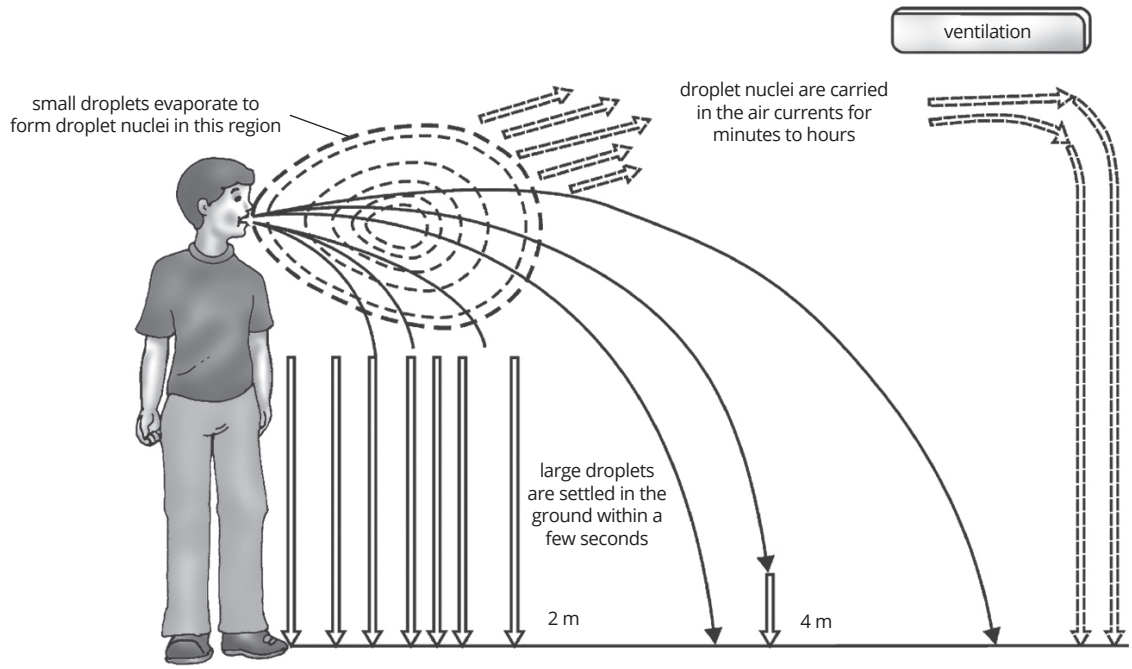


Fig. 2 Air transmitted droplet infection – overcrowded and poorly ventilated housing is a major factor in the spread of airborne infections.

However, since viruses do not use such pathways and have no cell walls, antibiotics do not work against viruses causing viral infections. Therefore, in case of common cold, taking antibiotic will not help. However, if common cold is accompanied by bacterial infection, then antibiotics will help but only against bacterial infection and not viral infection.

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:** Direct contact with the discharge from lesions or sores on the skin may cause infection. 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 (Fig. 2).
- **Contact with Soil Contaminated with Disease-causing Viruses and Bacteria:** 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.
- **Placental Transmission:** Diseases which may pass from the mother's body to the foetus through placenta. For example, virus of German 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 **vectors**. For example, houseflies carry the causative organisms of cholera, typhoid, dysentery and tuberculosis on their legs and mouthparts from the faeces and sputum to food and drinks, and contaminate them. When this contaminated food is taken by a healthy person, he/she gets the infection. The most common vector is the mosquito. Females of many species of mosquito require blood containing highly nutritious food in order to lay mature eggs. Mosquitoes feed on warm-blooded animals including humans and in turn transmit diseases from one person to another.
- **Airborne:** The pathogens may reach the humans with air and dust. The epidemic typhus spreads by inhalation of dried faeces of infected lice. Some examples of airborne diseases are tuberculosis, influenza, common cold and pneumonia.
- **Waterborne:** Diseases also spread through water contaminated with microbes. For example, contaminated water may contain excreta from someone suffering from infectious gut disease, such as cholera. When this water mixes with the water used for drinking, the cholera causing microbes will enter the new hosts and cause diseases in them. 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.
- **Unhygienic Conditions:** Dirty hands and fingers are also the sources of infection for various digestive and respiratory 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. As the natural defense mechanism of the person is destroyed by the AIDS virus, the patient dies from other infections or diseases.

Mode of Transmission of AIDS

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).

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.

AIDS does not spread through casual contact, such as handshake or hugs, or sports, like wrestling or by any other means in which we touch each other socially.

Study Tip

Facts about HIV Transmission

- HIV is a weak virus and hard to get. It cannot be transmitted through air or water outside the human body.
- One cannot get AIDS by using public toilets, swimming pools, showers and telephones.
- HIV does not transmit by being near to someone, touching someone or working with someone who is suffering from AIDS.

Organ-Specific and Tissue-Specific Manifestations

Different species of microbes have evolved to live in different parts of the body. These microorganisms enter the body through different portals.

Portal Specificity

If microbes from air enter the body through the nose, they are likely to go to the lungs. For example, bacteria causing tuberculosis and pneumonia enter the body through the nose via air and enter the lungs.

If microbes from the air enter the body through mouth, they are likely to settle and stay in the gut lining or in the liver. For example, bacteria causing typhoid, dysentery or diarrhoea stay in the parts of gut lining while virus causing jaundice reaches liver from digestive tract.

Nonportal Specificity

In this, the pathogen may enter through an organ but does not settle there. Instead, it may travel to any other part and settle there. For example, HIV causing AIDS enters the body mostly through sexual contact, but spreads to lymph nodes all over the body. Malaria-causing microbe, *Plasmodium*, enters the body through mosquito bite on skin, but it reaches liver, and then after multiplying, it goes to red blood cells.

Virus causing brain fever or Japanese encephalitis enters host through mosquito bite but goes on to infect the target organ, i.e., brain.

Tissue Specific Signs and Symptoms

The signs and symptoms of a disease depend on the tissue or organ which is targeted by the disease causing microbe. For example, if it targets the lungs, then, pain in chest, cough and breathlessness result. If the liver is the target organ, then it results in jaundice. If brain is the target then headache, vomiting, fits, giddiness or unconsciousness are seen. Thus, on the basis of knowledge of target tissue or organ, the signs and symptoms of infection can be known.

Also note that in addition to tissue-specific effects as stated above, there will be common effects also. Most of these common effects depend on the fact that body's immune system is activated in response to infection. An active immune system recruits many cells to the affected tissue to kill the disease causing microbe. This recruitment process is called **inflammation**. As a result of inflammation, there is swelling around the affected area and pain locally along with general effects like fever or uneasiness.

In case of infection by HIV causing AIDS, the body's immune system is affected. Many of the symptoms of the HIV are due to body's immune system getting weakened. For example, cold can become pneumonia, or minor gut infection can produce major diarrhoea. It is because of subsequent infections that people suffering from AIDS die.

The severity of disease depends on the number of microbes or pathogens present in the body causing that disease. If the number of pathogens infesting the body is very small, they will be overpowered by the body's immune response and the effect of disease will be very less. However, if the number of microbes infesting the body is very large, the disease can be severe, sometimes threatening the life. Thus, the immune response elicited by body's immunity is a major factor which determines the number of microbes surviving in the body and severity of the resultant disease.

Principles of Treatment

There are two principles or methods of treatment of an infectious disease by

- reducing the effects of the disease, and
- killing the cause of the disease.

Reducing the Effects of the Disease

This method aims at reducing the symptoms of the diseases. The symptoms are usually because of inflammation.

Thus, medicines can be given to the patient to bring down fever, reduce pain or loose motions.

Bed rest is also advised to conserve the energy required for healing. However, the treatment of symptoms does not make the microbe ineffective. It can only provide temporary relief from symptoms without curing the disease. For this, it is necessary to kill the microbe.

Killing the Cause of the Disease

The pathogens as virus, bacteria, fungi and protozoa have some essential biochemical processes which are peculiar to these groups and not shared with other groups. These processes may be pathway for respiration or synthesis of new substances. Drugs are available which block these biochemical processes and kill the infectious microbes. Usually antibiotics are the medicines that are administered to block the biochemical pathways of bacteria without harming human cells. Similarly, there are drugs that kill protozoa such as the malarial parasite.

Study Tip

Making anti-viral medicine is more difficult than making anti-bacterial medicines. This is because viruses have very few biochemical mechanisms of their own. Viruses enter our cells and use our biochemical machinery for their life processes. Thus, there are very limited specific targets on virus to aim at. However, despite this, there are many anti-viral drugs available now including drugs that keep HIV infection under control.

Principles of Prevention

In the previous section, you have studied about the principles of treatment to get rid of infection if someone gets a disease. However, there are three limitations of this approach.

- **First:** If someone falls sick, his/her body functions are damaged which may not recover completely.
- **Second:** Treatment will take time, which will keep the person bedridden for some time even if he gets proper treatment.
- **Third:** The person suffering from disease can serve as a source of further infection and spread the disease to others.

Therefore, **prevention of a disease is better than cure**. There are two ways of prevention of a disease – general and specific.

General Ways 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. Water can be treated to kill microbial contamination by boiling or other means.
- For **vector-borne infections**, we can provide clean environment so that these disease carrying vectors do not flourish there. Thus, public hygiene is the basic key to prevention of infectious diseases.

Providing Proper and Sufficient Food

- The immune system of our body keeps on fighting the disease causing microbes.
- Each time a microbe enters our body, our immune cells get into action and manage to kill the infection before it assumes a major proportion and takes the shape of a disease.
- Functioning of immune system is dependent upon the type of nourishment we receive. It will not be good if we do not get proper nourishment and food. Thus, providing proper and sufficient food is very necessary for prevention of a disease.

Specific Way of Preventing Infectious Diseases

You would have seen that sometimes if a person gets a type of disease, he does not get it again. This is related to body's immunity. Nowadays, occurrence of smallpox is rare, but about a hundred years ago, it was very common. However, if someone had small pox earlier and survived, he/she had no chance of getting small pox again. Thus, having disease once

prevented subsequent attacks of the same disease. This was the basis of immunity and immunisation.

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.

Thus, with the help of the immune system, body is able to distinguish between its own substances and foreign substances. When the body recognises foreign substances (pathogens), it makes special antibodies or cells that attack the pathogens and kill them. When these antibodies and special cells are produced, it is called the **immune response**.

Immunisation

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

Basis of Principle of Immunisation

- If a pathogen (infectious microbe) enters the body, the immune system will recognise it and respond against it.
- It also remembers each foreign substance and pathogen that enters the body specifically.
- For each type of pathogen, the immune system produces cells that are specific for that particular pathogen. These cells attack the pathogen entering the body.
- Next time if the same pathogen or its close relative enters the body, the immune system recognises it and responds with greater vigour.
- Thereby, it eliminates the second or subsequent infection even more quickly than the first time.
- This cycle goes on each time the pathogen enters the body.

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**.

Vaccine is a biological preparation of dead or weakened microbe that improves immunity to a particular disease.

Vaccination against a particular disease (such as measles and typhoid) will protect against that particular disease only.

The vaccine can be introduced in the body of a person mostly by injection and sometimes orally. When vaccine enters the body, it stimulates white blood cells (WBCs) in the body to produce antibodies against the disease-causing germs.

There are many vaccines available for preventing various infectious diseases and to provide a disease–specific method of prevention. Table 4 gives the important vaccines used to prevent diseases in infants and children. A vaccine may wear off (lose its strength) over time. Therefore, booster dose of that vaccine is required to increase antibodies against that disease again.

Some hepatitis viruses are transmitted through water. These cause jaundice. A vaccine is available against hepatitis A in the market. However, since this virus is present in water, children in most parts of our country are exposed to this virus. They become immune to hepatitis A virus by the age of five years. Under these circumstances, there is no need to administer hepatitis A vaccine to these children.

Table 4 Important vaccines for infants and children

For whom	Vaccine	Why
Infants (Below 1 year)	BCG (Bacillus of Calmette-Guerin) vaccine	Protection against Tuberculosis
	Oral Polio vaccine	Protection against Polio
	DPT (Diphtheria, Pertussis and Tetanus) vaccine	Protection against Diphtheria, Pertussis (whooping cough) and Tetanus
	Measles vaccine	Protection against Measles
	Chickenpox vaccine	Protection against Chickenpox
Children (Above 1 year)	MMR (Measles, Mumps and Rubella) vaccine	Protection against Measles, Mumps and Rubella
	TT	Protection against Tetanus

Study Tip

Immunisation and Edward Jenner

Vaccination (Latin: *vacca* means cow) is so named because the first vaccine was derived from a virus affecting cows, the cowpox virus. This virus in its weakened form provides a degree of immunity to smallpox, which is a contagious disease that is sometimes deadly to humans.

Jenner observed that the milkmaids who had suffered from cowpox earlier did not catch smallpox even during epidemics. He deliberately gave cowpox to people and found that they became resistant to smallpox. This is because the smallpox virus is closely related to the cowpox virus. Since then the word vaccination came into being.

Solved Examples

Very Short Answer Type Questions

10. Name two diseases caused by protozoa.

Ans. Malaria and Kala-azar.

11. Name one bacterial and a viral sexually transmitted disease.

Ans. **Bacterial** – syphilis
Viral – AIDS

12. On which factor does the severity of disease manifestation depend?

Ans. The severity of the disease manifestation depends on the number of microbes causing the disease.

13. Why are antibiotics not effective for viral diseases?

Ans. Viruses generally do not carry out metabolic activities of their own, which are targeted by the antibiotics. Hence, viruses remain unaffected by antibiotics.

14. Why does inflammation take place in certain diseases? Mention its local and general effect.

Ans. In response to an infection, the immune system of the body gets activated and recruits many cells to the affected tissue to kill the disease causing microbes. This results in inflammation. Swelling and pain are local effects of inflammation and its general effect is fever.

15. How does HIV infection affect the infected person?

Ans. HIV attacks the white blood corpuscles and reduces the immunity of the person. Such a person is prone to various diseases. As the natural defense mechanism of the person is destroyed by HIV, the patient dies from other infections or diseases.

Short Answer Type Questions

16. Define antibiotics and explain how it is able to check bacterial growth.

Ans. Antibiotics are chemical substances produced by living organisms such as bacteria and fungi, which can kill or stop the growth of some pathogenic microorganisms.

Antibiotics block biochemical pathways important for bacteria. Many bacteria, for example, make a cell wall around themselves for protection. Penicillin is an antibiotic that blocks the biochemical pathways by which bacteria build
a cell wall around them. As a result, the bacteria die.

17. (a) What is immunisation? Name any four diseases which can be prevented by vaccination.

(b) What are the general ways of preventing infections?

Ans. (a) Immunisation is the process of developing immunity or resistance against a particular pathogen.

Diseases prevented by vaccination – tuberculosis, polio, whooping cough and diphtheria.

(b) General ways of preventing infectious diseases:

(i) **Preventing Exposure to Infectious Microbes:** Providing healthy and hygienic living condition which are not overcrowded will prevent exposure to air borne microbes. Safe drinking water will prevent exposure from water borne microbes. Clean environment should be provided so that disease carrying vectors do not flourish. Thus public hygiene is the basic key to prevention of infectious diseases.

(ii) **Providing Proper and Sufficient Food:** Proper nourishment and food provides a stronger immune system to an individual which help them fight against infectious agents.

Long Answer Type Questions

18. (a) Which system of our body is activated in response to infection and how does it respond?

(b) Differentiate between vaccination and immunisation.

Ans. (a) The immune system of our body is activated in response to an infection. When a microbe enters our body, the body's immune system gets activated and recruite many cells to the affected tissue to kill the disease causing germs. This recruitment process is called inflammation. During this process, certain local effects such as swelling and pain, and general effects such as fever, develop. It takes some time for the immune system to kill germs. So, a person with a disease is sick for a while. When the immune system has killed the germs, a person gets better.

(b)

Vaccination	Immunisation
Vaccination is the process of administering vaccine into the body for developing resistance against a particular pathogen.	Immunisation is the process by which the body acquires immunity against a disease.
Vaccination needs booster doses to retain the strength of the vaccine through out lifetime.	Successful vaccination results in immunisation.

19. (a) What are vectors? How do they spread diseases?

(b) What are the various methods of treatment of a disease?

Ans. (a) An intermediary organism that carries and transmits an infectious pathogen from the reservoir of infection to a healthy person is known as vector. For example, mosquito and housefly.

Vectors like houseflies carry the causative organisms of cholera, typhoid, dysentery and tuberculosis on their legs and mouthparts from the faeces and sputum to food and drinks and contaminate them. When this contaminated food is taken by a healthy person, he/she gets infected. Vectors like mosquitoes feed on warm blooded animals including human and in turn transmit diseases from one person to another.

(b) There are two methods of treatment of an infectious disease:

(i) **By Reducing the Effects of the Disease:** For this, the treatment is provided to reduce the symptoms because of inflammation. Thus, medicines can be given to the patient to bring down fever, reduce pain or loose motion. However, it only provides temporary relief.

(ii) **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 like bacteria, virus, fungi or protozoa.

Check Your Progress 2

Multiple-Choice Questions

1. *Ascaris lumbricoides* cause damage to our

(a) brain. (b) intestine.

(c) liver. (d) lower limbs.

2. Which disease is not transmitted by mosquitoes?

(a) Dengue (b) Malaria

(c) Encephalitis (d) Pneumonia

3. Which one of the following is not a viral disease?

(a) Dengue (b) AIDS

(c) Typhoid (d) Influenza

4. Acquired Immuno Deficiency Syndrome could develop due to

(a) defective liver. (b) defective thymus.

(c) kidney failure. (d) none of these.

Very Short Answer Type Questions

5. Name two airborne diseases.

6. Name a disease in which

(a) virus, bacterium and protozoan can be the causative agent.

(b) mass scale immunisation takes place.

7. Name the causal organism of ringworm, athlete's foot and kala-azar.

8. Expand the following:

(a) AIDS (b) SARS

9. What is droplet infection?

10. What are the symptoms and diseases associated with the following:

(a) When the microbe attacks the lungs.

(b) When the virus enters the liver.

11. (a) Signs and symptoms of a disease depend on the tissue or organ which the microbe targets. Explain with examples.

(b) 'Becoming exposed to or infected with an infectious microbe does not necessarily

mean developing noticeable disease.' Comment.

12. Differentiate between general way and specific way of prevention.

Short Answer Type Questions

13. (a) Name the pathogen and target organ of malaria and explain how it spreads.

(b) Mention any two diseases that can be prevented by immunisation.

14. 'Prevention is better than cure'. Explain giving three reasons. What precaution will you take to justify this statement.

15. Give reasons:

(a) If a person had smallpox once, there is no chance that he will suffer from it again.

(b) A person suffering from HIV-AIDS may die due to minor cold or gut infection.

(c) A particular medicine is effective for diseases caused by a particular group of organism and not others.

Long Answer Type Questions

16. (a) What are vaccines? How does having a disease once prevent subsequent attacks of the same disease?

(b) It was diagnosed that Preeti suffered from Japanese encephalitis. Which organ of Preeti's body is affected? Is it a vector-borne disease? If yes, name the vector.

17. (a) Comment on the following statements:

(i) Antibiotics are effective in case of bacteria but do not affect viruses.

(ii) Balanced diet is necessary for maintaining healthy body.

(iii) AIDS is considered a syndrome not disease

(b) Why is there no need to administer hepatitis A vaccine to children?

Enrichment Activities

❑ To Study the Effects of Balanced Nutrition and Clean Living Condition on the Health of Children

Procedure

- Select ten families who are well off and ten families who are poor from your locality and conduct a survey.
- Take children below five years of age from these families and measure the height of these children.
- Draw a graph of the height of each child against its age for both sets of families and compare.

Observation

There is difference in height of the children of the two groups. Children from well off families have better growth than children of poor families.

Conclusion

Health of children depends on a strong immune system. The functioning of immune system depends on proper and sufficient availability of food and nourishment. Children from well off families take adequate balanced diet and live in clean environment and have better conditions of living than children from poor families. Therefore, they are healthier and have better growth.

❑ To Study the Frequency of Occurrence of Acute Diseases and Chronic Diseases in a Particular Area

Procedure

- Survey your locality and find out about acute and chronic diseases in your area. Answer the following questions.
  1. How many persons suffered from acute diseases during the last three months?
  2. How many persons suffered from chronic diseases during the last three months?
  3. What is the total number of persons suffering from chronic diseases in your area?
- Are the responses to questions 1 and 2 different?
- Are the responses to questions 2 and 3 different?
- What is the reason for these differences?
- What effect will it have on the general health of the population in your area?

Observation

After surveying the area for three months, it was found that most people in the area suffered from one or the other acute disease and only a few persons suffered from one or the other chronic disease in these months.

Conclusion

Acute diseases occur frequently but these last for short duration and the patient recovers soon. Therefore, acute diseases do not cause major effect on general health of the patient. On the other hand, chronic diseases though occur less frequently but last for a long duration. Such diseases affect the general health of the patient and the affected person fails to lead a normal life.

Higher Order Thinking Skills (HOTS) Questions

1. At a rural health centre, a nursing mother is given an immunisation schedule for BCG and DPT to be given to her baby. What are the diseases against which the child will be protected?
2. It has been diagnosed that the body of a patient has lost the capacity to fight any infection. Name the disease he is suffering from. Which type of microbe is responsible for this disease? How it can be controlled?
3. Why does wearing socks and full sleeves at night does not prevent the attack from dengue?
4. Why is it possible to immunise against rabies after the dog bite?
5. Why does it take a week to cure bad cold even after taking medicine?
6. While going abroad, Vivaan was asked to get vaccinated against certain diseases. Why?

Self-Assessment

Multiple-Choice Questions

1. Acne is caused by
   (a) *Pseudomonas.* (b) *Streptococcus.*
   (c) *Staphylococcus.* (d) *Pneumococcus*.
2. After vaccination, the body builds up
   (a) pathogens. (b) antibodies.
   (c) toxins. (d antigens.
3. The target organ in jaundice is
   (a) lungs. (b) liver.
   (c) gut. (d) red blood cell.
4. Anthrax disease is caused by
   (a) fungi. (b) viruses.
   (c) protozoa. (d) bacteria.
5. Dengue is transmitted by female ..... mosquito.
   (a) *Anopheles* (b) *Aedes*
   (c) *Culex* (d) None of the above

Assertion–Reason Type Questions

For question numbers 6 to 13, two statements are given – one labelled Assertion (A) and the other labelled Reason (R). Select the correct answer to these questions from the codes (a), (b), (c) and (d) as given below.

(a) Both A and R are true and R is the correct explanation of the assertion.
(b) Both A and R are true but R is not the correct explanation of the assertion.
(c) A is true but R is false.
(d) A is false but R is true.

6. **Assertion:** There are five F's for the prevention of faecal-oral disease.
   Reason: Health is absence of a disease.
7. **Assertion:** Social health comprises of happiness of an individual at workplace, home and society.
   Reason: Social health is an integral part of overall health.
8. **Assertion:** Both personal and community hygiene are important to remain healthy.
   Reason: Our immediate environment plays a crucial role in deciding our health.
9. **Assertion:** Chronic diseases are short term diseases and can be fatal.
   Reason: Acute diseases are short term diseases.
10. **Assertion:** Symptoms are features which the doctors look for to identify the disease.
    Reason: Laboratory test can be prescribed based on these symptoms to have further accuracy in the diagnosis.
11. **Assertion:** Tuberculosis spreads through contaminated air.
    Reason: Tuberculosis is a type of viral disease.
12. **Assertion:** Prevention is better than cure.
    Reason: Maintaining personal and community hygiene is a part of prevention.
13. **Assertion:** Antibiotics are usually prescribed for treating pneumonia.
    Reason: Antibiotics cure bacterial infection.

Source-based/Case-based/Passage-based/ Integrated assessment questions

Answer the questions on the basis of your understanding of the following passages and the related studied concepts.

14. Chronic diseases are long term diseases which includes cancer, diabetes, tuberculosis and elephantiasis. These long-term diseases affect people of all age groups and severely affect the life of an individual. The symptoms of a disease gets visible after a period of time. Many chronic diseases have genetic origin but environment can also contribute to risk, and so can our lifestyle, including our diet, physical activities, and smoking habit.

I. (a) What are the long term effects of chronic diseases?

(b) What are communicable diseases?

(c) (i) List two environmental factors responsible for causing chronic diseases.

OR

(ii) What kind of disease is Alzheimer's disease?

II. (a) Which of the following is a chronic disease?

(i) Typhoid (ii) Diabetes

(iii) Dysentery (iv) Cholera

(b) The communicable diseases are those which

(i) develop after birth due to nutrient deficiency.

(ii) are present since birth.

(iii) can spread from infected person to healthy person.

(iv) are caused by malfunctioning of body organs.

(c) Identify the cause of the diseases given below and select correct category for them from the following.

Marasmus, anaemia, goitre, beriberi

(i) Infectious disease

(ii) Congenital disease

(iii) Deficiency disease

(iv) Degenerative disease

(d) Alzheimer's disease is mostly found in aged people. Alzheimer's disease is a type of

(i) communicable disease.

(ii) congenital disease.

(iii) acute disease.

(iv) degenerative disease.

(e) The given table shows information about some diseases. Identify P, Q, R and S, and select the correct option from the following.

Diseases	Causative agents
P	Variola virus
Typhoid	**Q**
R	*Mycobacterium leprae*
AIDS	**S**

(i) 'P' is an acute disease of respiratory tract.

(ii) 'Q' is a bacteria spread through contaminated food and water.

(iii) 'R' is chronic disease of lungs.

(iv) 'S' is immune cell destroying bacteria.

15. Amit lives in a crowded locality. There are open drains and improper sanitation. Many children of his locality are suffering from polio. Amit got to know about the Pulse Polio Program of the government. He spoke to his father and told him that he should ensure that all children get the polio drops.

I. (a) Name the causative agent of polio.

(b) What is vaccination?

(c) (i) Name two diseases against which vaccines are available.

OR

(ii) What is the Pulse Polio Program?

II. (a) The causative agent of polio is

(i) bacteria. (ii) virus.

(iii) fungi. (iv) protozoa.

(b) The causative agent of polio enters the human body through

(i) droplets in air. (ii) mosquito bite.

(iii) contaminated food and water.

(iv) human to human contact.

(c) When vaccine is administered in the body, it stimulates the white blood cells to produce

(i) antigens. (ii) antibodies.

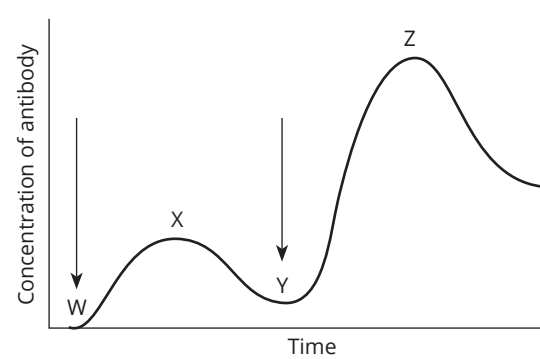
(iii) macrophages. (iv) platelets.

(d) BCG vaccine is used to protect against

(i) tuberculosis. (ii) tetanus.

(iii) diphtheria. (iv) mumps.

(e) A person is infected by a virus and developed disease. After few months, he is again infected by the same pathogen. The following graph indicates his immune response.



Identify W, X, Y, Z and select the correct option.

(i) 'X' is initial exposure.

(ii) 'W' is primary immune response.

(iii) 'Y' is administration of medicine.

(iv) 'Z' is secondary immune response.

Very Short Answer Type Questions

16. Name the disease caused by consuming contaminated food and water.

17. Name the organisms causing the following diseases:

(a) sleeping sickness

(b) kala-azar.

18. Why do only female mosquitoes feed on the blood of warm-blooded animals?

19. Imagine that you have suffered from chickenpox when you were in class 3. Why will you not suffer from it again?

20. List the names of any two diseases caused by viruses stating their mode of communication in each.

21. How do diseases spread through air? Name two such diseases.

22. Aman is suffering from malaria. Which part of his body will be affected? Name the vector for this disease.

23. What would be the symptoms if the microbes infect the (a) lungs? (b) Liver?

24. Explain why some children fall ill more frequently than others living in the same locality.

Short Answer Type Questions

25. Name the causative organism of Japanese encephalitis. How does it enter the body? Which organ gets affected? What are the symptoms if this organ gets affected?

26. Give reasons:

(a) Majority of children in many parts of India are already immune to hepatitis A.

(b) Chronic diseases cause more harm to the body than acute diseases.

(c) Infectious diseases are called communicable diseases.

Long Answer Type Questions

27. (a) If penicillin is given to a person suffering from jaundice, it doesn't have any effect on the infection. Why?

(b) Name the disease which has been eradicated from the world. State and explain the principle behind its eradication.

(c) Same drug does not work against the microbes belonging to different groups. Why? State the mechanism of antibiotics in killing bacteria.

28. Educating parents would help a lot in reducing incidences of diseases in children." Justify the statement with five reasons.

Let's Compete

Multiple-Choice Questions

1. Most of the skin infections are caused by

(a) viruses. (b) fungi.

(c) insect bites. (d) worms.

2. The process by which active immune system employs many cells to the infected tissue is called

(a) infection. (b) invasion.

(c) inflammation. (d) vaccination.

3. Which one of the following is a vaccination against tuberculosis?

(a) BCG (b) OPV

(c) DPT (d) TAB

4. SARS is a disease caused by

(a) virus. (b) bacteria.

(c) protozoa. (d) fungi.

5. Which one is an acute disease?

(a) Diabetes (b) Hypertension

(c) Tuberculosis (d) Typhoid

6. Pain in abdomen is a/an

(a) sign of a disease.

(b) cause of a disease.

(c) effect of a disease.

(d) symptom of a disease.

7. Which of the following is not a vector borne disease?

(a) Kala-azar

(b) Japanese encephalitis.

(c) Pneumonia

(d) Dengue

8. The disease that affects our lungs is

(a) AIDS. (b) tuberculosis.

(c) rabies. (d) polio.

9. Japanese encephalitis is caused due to

(a) protozoa. (b) virus.

(c) bacteria. (d) mosquito.

10. HIV virus attacks ..... cells in our body.

(a) red blood (b) white blood

(c) liver (d) nerve

Life Skills

1. You would have heard your grandparents telling you that they used to sleep comfortably in open because there were comparatively very less mosquitoes. However, now they wonder how mosquitoes have swarmed our surroundings, and it is impossible to even sit outside during evenings.
   (a) Give reasons for such an increase in the number of mosquitoes in our surroundings and homes.
   (b) What steps will you take to check further spread of mosquito breeding?
   (c) How will you protect yourself and your family from mosquito-borne diseases?
2. Sneha and Ankita are good friends and study in Class X. One day Sneha came to school with running nose, reddish and watery eyes. She was also coughing often. She met Ankita in the morning assembly who advised her to sit on a separate desk in the classroom till she recovers.
   (a) Name the disease Sneha is suffering from. Name the causative organism also.
   (b) List any two preventive measures against the disease.
   (c) Do you think what Ankita did was right? Why so?
3. Amita and Roshan are classmates. Amita is cheerful, helps others and takes keen interest in her work. She shows lot of enthusiasm in completing the work assigned to her. On the other hand, Roshan is lethargic, physically weak and does not want to do any work. He gets irritated and loses his temper for no reasons.

   Now, answer the following questions:
   (a) Do you consider Amita and Roshan happy? Give reasons in support of your answer.
   (b) Give any two signs each of
      (i) good physical health and
      (ii) good mental health.

Art Integration

TOWARDS EXPERIENTIAL LEARNING

Role play

Perform an act in your school morning assembly based on the spread of infectious disease.

Methodology

Divide the students of your class in two groups (group A and B). Both groups will act as a people living in a particular society (society A and B).

One student will act as SARS-CoV-2 (the virus causing COVID-19). The student representing virus will enter to both the societies but spreads infection to people living in society B only.

(You can explain about safety majors, principles of prevention and the modes of spread of infectious disease through this act).

Concept Map