Chapter 7
Human Health and Diseases

EXERCISE-7.1

1 Marks

1. What are the various public health measures, which you would suggest as safeguard against infectious diseases?

Solution:

Public health measures are the measures taken to prevent and check the spread of different infectious diseases. It is taken to lessen contact with infectious agents.

Some of these preventive measures are as follows:

- Isolation – It prevents the spreading of airborne diseases (chicken pox, pneumonia, tuberculosis, etc.). We isolate an infected person to reduce the chances of the disease spreading.
- Vaccination – It protects the body against communicable diseases by administering some agents that impersonate the microbe in the body. This helps in rendering passive immunization to the body. Vaccines are available for some diseases, such as mumps, polio, measles, etc.
- Vector eradication – Diseases such as dengue, malaria, etc., that spread through vectors can be prevented by ensuring a clean environment and checking the breeding of mosquitoes which is facilitated by regulating water, and not letting it stagnate near residential areas. Some other measures are periodic cleaning of coolers and the use of mosquito nets and insecticides. It can also be controlled by introducing Laxvivorous fish such as Gambusia in ponds, as they control mosquito larvae breeding in stagnant water.
- Maintaining public and personal hygiene is one of the most important practices to prevent the spread of infectious diseases. It includes maintaining a clean body, consuming healthy and nutritious food, clean water, etc. Proper disposal of wastes, excreta, and disinfection of water reservoirs are some of the measures that can be adapted as part of public hygiene.

2. In which way has the study of biology helped us to control infectious diseases?

Solution:

Biology is a vast field of Science dealing with life forms and their processes. It has helped in controlling infectious diseases in the following ways:

- Complete eradication of fatal diseases such as smallpox was possible with the use of immunization schemes and vaccines
- Other infectious diseases, such as diptheria, polio, pneumonia, etc., have been successfully controlled with the use of vaccines
- Treatment of several infectious diseases have successfully been carried out with the use of antibiotics and other drugs

3. How does the transmission of each of the following diseases take place?

(a) Amoebiasis (b) Malaria (c) Ascariasis (d) Pneumonia

Solution:

The transmission of diseases is as given in the table:

Name of the disease	**Transmission**
Amoebiasis	Ingestion of quadrinucleated cysts of Entamoeba histolytica can cause the cysts to be passed from the patient’s faeces via water and food.
Malaria	Plasmodium, or the malarial parasite, is communicated to a healthy person from a patient when bitten by a female Anopheles mosquito
Ascariasis	It can be passed by ingesting contaminated water and food with the embryonated eggs of Ascaris
Pneumonia	Transmitted by droplets and sputum given out when patient coughs. It is a bacterial disease

4. What measure would you take to prevent water-borne diseases?

Solution:

Measures taken to prevent water-borne diseases are as follows:

- Provision of clean water for drinking
- Industries should be prohibited from discharging wastes into water bodies
- Frequent cleaning and disinfecting of water tanks and reservoirs

5. Discuss with your teacher what does 'a suitable gene' mean, in the context of DNA vaccines.

Solution:

The term 'suitable gene' is used to refer to a particular section of DNA that can be altered in the host in order to synthesize a particular protein which attacks and kills a specific disease-causing entity.

EXERCISE-7.2

2 Marks

1. Name the primary and secondary lymphoid organs.

Solution:

Primary lymphoid organs are – Thymus and bone marrow

Secondary lymphoid organs are – Mucosal-associated lymphoid tissues (MALT), Lymph nodes, Spleen, Peyer's patches (small intestine)

2. The following are some well-known abbreviations, which have been used in this chapter. Expand each one to its full form:

(a) MALT (b) CMI (c) AIDS (d) NACO (e) HIV

Solution:

The expansion is as follows:

(a) MALT – Mucosal-Associated lymphoid tissues

(b) CMI – Cell-mediated Immunity

(c) AIDS – Acquired Immuno-Deficiency Syndrome

d) NACO – National Aids Control Organization

(e) HIV – Human Immuno-deficiency Virus

3. Differentiate the following and give examples of each:

(a) Innate and acquired immunity (b) Active and passive immunity

Solution:

The differences are as follows:

(a) Innate and acquired immunity

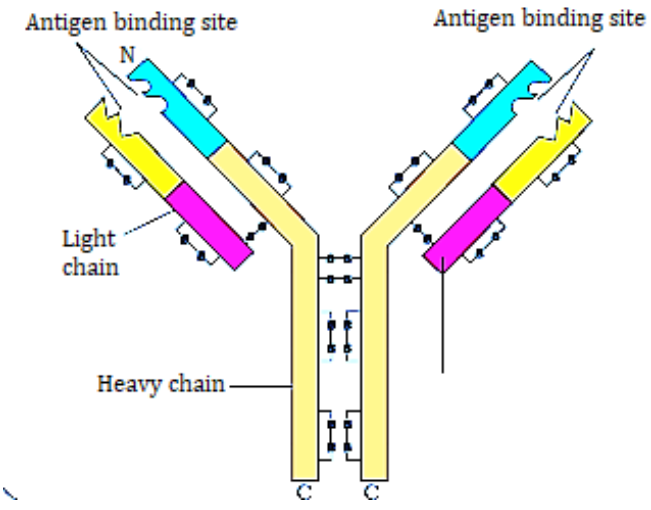
Innate immunity	Acquired immunity
Non-specific in nature	Specific in nature
Present from birth	It is acquired in response to a particular pathogen
Has different barriers	Has a memory of antibody
For instance, mucus traps bacteria and other particles	For instance, post-vaccination antibodies respond

(b) Active and passive immunity

Active immunity	Passive immunity
In response to pathogens, the body releases antigens	To initiate immunity, an antigen is injected
Slower response	Faster response
For instance, post-vaccination antibodies respond	For instance, Colostrum is rich in antibodies

4. Draw a well-labelled diagram of an antibody molecule.

Solution: The diagram is as follows:



5. What are the various routes by which transmission of human immunodeficiency virus takes place?

Solution:

The various routes by which transmission of the human immunodeficiency virus (HIV) takes place are as follows:

- Sexual relation with the person infected
- Organ transplantation from an infected person
- Transfusion of contaminated blood products and blood
- Transmitted from mother to the child through the placenta

EXERCISE-7.3

4 Marks

1. What is the mechanism by which the AIDS virus causes deficiency of immune system of the infected person?

Solution:

Upon managing to enter the body, this virus enters into macrophages, where the RNA genome of the virus duplicates for the formation of viral DNA by the action of the reverse transcriptase enzyme. The viral DNA is then incorporated into the DNA of the cells of the host, which targets the infected cells to synthesize virus particles. The macrophages continue to produce the virus, serving as an HIV factory. On the other hand, HIV enters the helper T-lymphocytes, replicating and producing progeny viruses, which when released in the blood, target other helper T-lymphocytes, which is reiterated, causing a progressive decrease in the count of helper T-lymphocytes in the patient's body. In the long run, there is a significant decline in the count of helper T-lymphocytes resulting in the weakening of the defence mechanism of the body. This is referred to as acquired immunodeficiency.

2. How is a cancerous cell different from a normal cell?

Solution: The differences are as follows:

Cancerous cell	**Normal cell**
As these cells do not possess the property of contact inhibition, they keep dividing, forming a cluster of cells	As these cells possess the property of contact inhibition, they stop dividing once they come in touch with other cells
Do not experience differentiation	Experience differentiation after attaining growth
Cells are not confined; they move to the adjacent tissues and interrupt their functioning	The cells are confined to a specific location

3. Explain what is meant by metastasis.

Solution:

Metastasis is a pathological process that is observed in malignant tumours. In this process, the cancerous cells spread to different body parts and divide indefinitely to form a cluster of cells known as a tumour. Some of these cells from the tumour get sloughed off and manage to enter into the bloodstream, from where they arrive at the distant parts of the body, and thus the formation of new tumours is initiated as they actively divide.

4. List the harmful effects caused by alcohol/drug abuse.

Solution: The harmful effects of alcohol and drug abuse are as follows:

Harmful effects of alcohol:

- **On individual –** It has an adverse effect on the body. When excess alcohol is consumed, it damages the nervous system and the liver, which is a vital organ. This leads to other symptoms such as fatigue, depression, weight loss, aggression, loss of appetite. In extreme cases, heart failure leading to coma and death is also observed.
- **On family –** Excess alcohol consumption by any family member can have destructive effects on the family members as it may lead to domestic violence, verbal abuse, irritation, insecurity, etc.
- **On society –** It leads to impulsive behaviour, fading social web, violence, and lack of interest in social activities.

Harmful effects of drugs:

- **On individual –** The effect of drugs on one's body is severe, more so on the central nervous system. It can lead to malfunctioning of different organs of the body such as liver, kidney, etc. in such individuals, HIV spreads rapidly among drug users as they share used needles while they inject drugs into the body. Drug addicts face both short-term and long-term effects, some of which are mood swings, aggressiveness, depression, etc.
- **On family and society –** A drug addict creates issues within the family and society. When a person is dependent on drugs, he/she becomes irritated, frustrated, and anti-social.

5. Do you think that friends can influence one to take alcohol/drugs? If yes, how may one protect himself/herself from such an influence?

Solution:

Yes, friends can have an influence on friends to start taking drugs and consuming alcohol. The following actions can be taken as precautionary measures to protect oneself from alcohol/drug abuse, they are:

- One must have a strong control over his/her will. One should refrain from experimenting with alcohol just for the sake of trying/curiosity/fun, etc.
- Stay away from people who are into drugs.
- Seek elderly advise, peer or medical assistance.
- Enlighten yourself with enough knowledge about the consequences of drug abuse.
- Go in for a counselling session.
- Take up some hobby/extracurricular activity.
- If depression or frustration levels persist or heighten, seek immediate medical or professional help.

6. Why is it that once a person starts taking alcohol or drugs, it is difficult to get rid of this habit? Discuss it with your teacher.

Solution:

Alcohol consumption and usage of drugs have a severe, addictive impact linked with euphoria, rendering a momentary feeling of well-being. Regular intake of drugs can increase the tolerance level of the receptors of the body, which furthermore leads to more drug consumption.

7. In your view, what motivates youngsters to take to alcohol or drugs and how can this be avoided?

Solution: Many factors motivate the youth towards drugs or alcohol. Some of the initial causes are curiosity, excitement, adventure, experimentation, etc. Some switch to consuming drugs and alcohol to overcome negative emotions such as pressure, depression, stress, frustration, etc. in order to perform fairly

well in other streams. A few media, such as the internet, television, newspaper, movies etc., are responsible for endorsing the idea of using alcohol to the youth. Some more reasons can be unsupportive family structure and unstable relationships. Peer pressure can also cause individuals to take up drugs and alcohol.

Some of the preventive measures against the use of drugs and alcohol are as follows:

- Motivation from parents and elders to develop strong willpower against it
- Awareness about the ill effects of alcohol should be inculcated in children by parents. Proper counselling and knowledge must be given regarding the repercussions of alcohol addiction.
- Parents should take responsibility for monitoring the social circle of their children and must advise them against the wrong company
- Encourage students to dedicate their energy to other activities
- Proper medical and professional assistance should be provided if symptoms of depression and frustration are observed.