# 1 The Leaf

**Key concepts**

- Structure of a leaf
- Types of leaves
- Types of venation
- Functions of leaves
- Modifications of leaves
- Insectivorous plants
- Vegetative propagation by leaves

There are many types of useful plants around you. They provide food grains, pulses, fruits, vegetables, sugar, tea, coffee, wood and medicines. Some plants are small, some are big. The leaves of different plants are of different shapes and sizes. Their flowers also vary in shape, size and colour. But, all these plants consist of two parts: the part above the ground is called the shoot system; the part below the ground is called the root system. The shoot system consists of the stem, branches, leaves, flowers and fruits. The root system consists of the roots.

## The structure of a leaf

A leaf is a flat, thin and broad outgrowth of a stem. The point on the stem from where a leaf arises is called a node. A leaf develops from a node. Branches also arise on a stem from the nodes.

A leaf is generally green in colour. The shape and size of leaves vary from one plant to another. But all leaves have the following main parts:

- **Lamina or leaf blade:** This is the thin, flat, expanded part of a leaf. It is mostly green in colour. The edge of the leaf blade is known as the margin of the leaf. The tip of the leaf blade is called the leaf apex.
- **Leaf stalk or petiole:** This is the short cylindrical part of a leaf. The petiole attaches lamina to the stem. In some plants, leaves do not have a petiole and directly arise from the leaf base. Leaves that do not have a petiole are called **sessile or epetiolate leaves.**
- **Midrib:** The lamina has a thickened vein along its centre called the midrib. The midrib extends from the petiole up to the tip of the leaf.

**Key points**

- The shoot system consists of the stem, branches, leaves, flowers and fruits. The root system consists of the roots.
- A leaf is a flat, thin and broad outgrowth of a stem.

The leafless part of a stem between two successive nodes are called internodes.

The leaves that have a petiole are called petiolate leaves

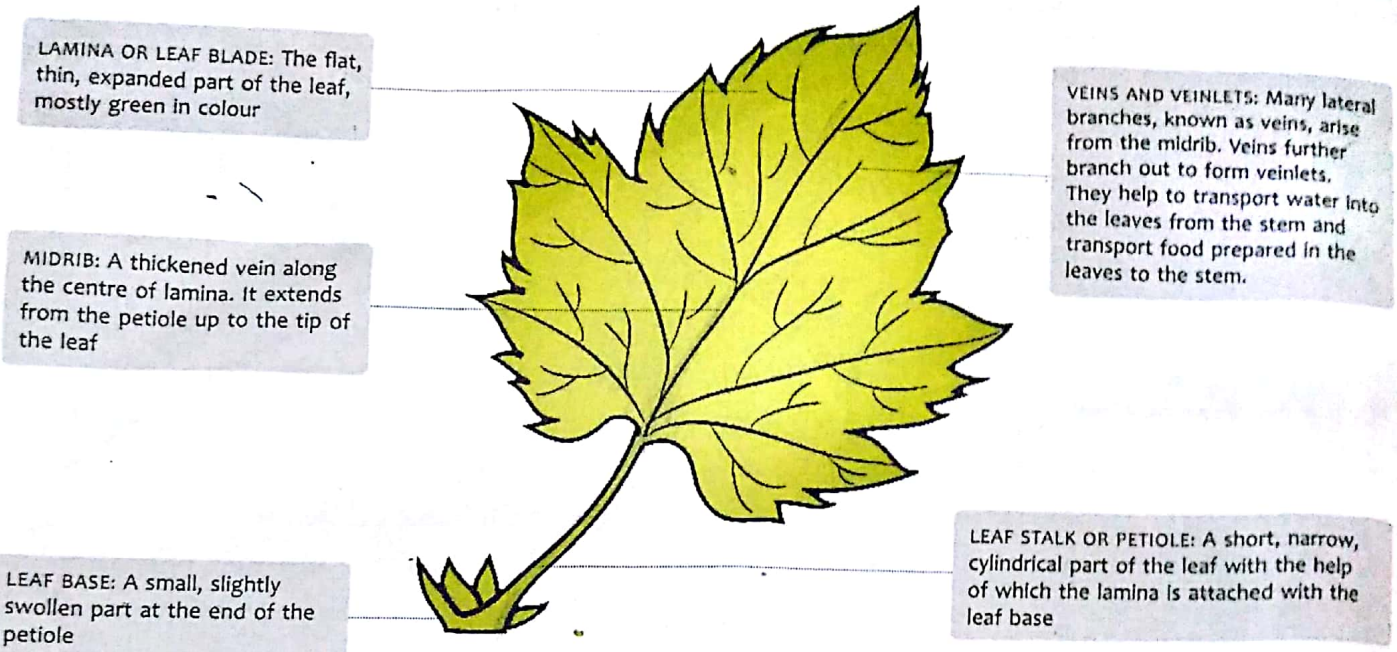



Fig. 1.1 | Parts of a leaf

**Did you know?**

The angle between the stalk of a leaf and the stem is called an axil. A bud, called an axillary bud, is usually present in the axil of a leaf.

- **Veins and veinlets:** Many lateral branches, known as **veins**, arise from the midrib. Veins further branch out to form **veinlets**. The petiole, midrib, veins and veinlets help to transport water into the leaves from the stem. They also transport food prepared in the leaves to the stem.
- **Leaf base:** This is a small, slightly swollen part at the end of the petiole.

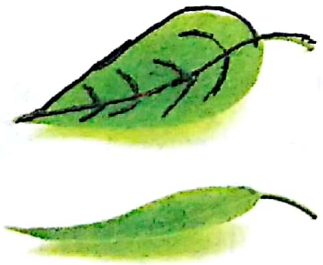


Fig. 1.2 | In a simple leaf, there is a single leaf blade or lamina.

## Types of leaves

Leaves can be divided into two types – simple leaves and compound leaves.

**Simple leaf** A simple leaf has a single leaf blade. It has an axillary bud. Some examples of plants with simple leaves are peepal, guava, mango and hibiscus (Fig. 1.2). In some plants such as prickly poppy and cotton, the leaf blade has many incisions. However, the incisions are not deep enough to divide the leaf blade into many distinct parts.

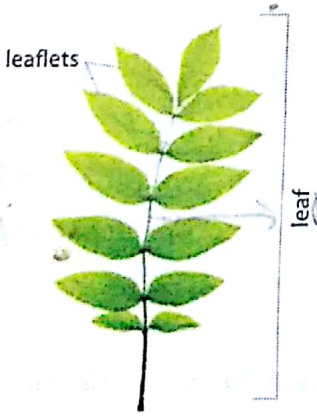



Fig. 1.3 | In a compound leaf, the leaf blade is divided into many parts.

**Compound leaf** In a compound leaf, the leaf blade is clearly divided into many distinct parts called **leaflets**. Unlike simple leaves, the leaflets do not have axillary buds. Some examples of plants with compound leaves are neem, *Acacia*, gulmohar and rose (Fig. 1.3).

## Types of leaf venation

The arrangement of veins and veinlets on the lamina of a leaf is called **venation**. It is mainly of two types – reticulate and parallel venation.

**Reticulate venation** In some leaves, the veins and veinlets are irregularly distributed over the entire lamina, forming a network. Such leaves are said to have reticulate venation (Fig. 1.4). The word 'reticulate' means net-like. The leaves of plants such as peepal, guava and mango have reticulate venation.

Fig. 1.4 | Reticulate venation

**Parallel venation** In some leaves, the veins run parallel to each other. Such leaves are said to have parallel venation (Fig. 1.5). The leaves of plants such as banana, grass and wheat have parallel venation. In the leaves of grasses and wheat plants, the veins run from the leaf base to the tip. However, in a banana leaf, the veins run laterally from the midrib.

Fig. 1.5 | Parallel venation

## Arrangement of leaves on a stem

The arrangement of leaves on a stem is known as **phyllotaxy**. Phyllotaxy varies from plant to plant. There are three different ways in which leaves can be arranged on a stem, namely, alternate, opposite and whorled arrangement.

**Alternate arrangement** In this type of arrangement, only one leaf arises from each node. The leaves are attached to the stem in a spiral pattern. Some examples of plants with alternate arrangement of leaves are sunflower, mango and China rose (Fig. 1.6a).

**Opposite arrangement** In this type of arrangement, a pair of leaves arises from the same node but the leaves grow opposite to each other. In some plants such as guava and jasmine, successive pairs of leaves are parallel to each other. On the other hand, in plants such as *Calotropis* and basil, successive pairs of leaves are placed at right angles to the each other (Fig. 1.6b).

**Whorled arrangement** In this type of arrangement, a set of three or more leaves grows from the same node. The set of leaves are at the same level and form a whorl (or circle). Some examples of plants with whorled arrangement of leaves are *Nerium oleander* (*kaner*) and *Alstonia scholaris* (devil tree) (Fig. 1.6c).

**Did you know?**

Generally, dicotyledonous plants have reticulate venation and monocotyledonous plants have parallel venation.

**Activity 1**

Aim: To study the venation of a leaf

Procedure: Take a peepal leaf and soak it in water for a week. Change the water every second day. Gently rub the lamina of the leaf with your fingers.

Observation: The green portion of the leaf will come off leaving a very fine network of veins showing reticulate venation.

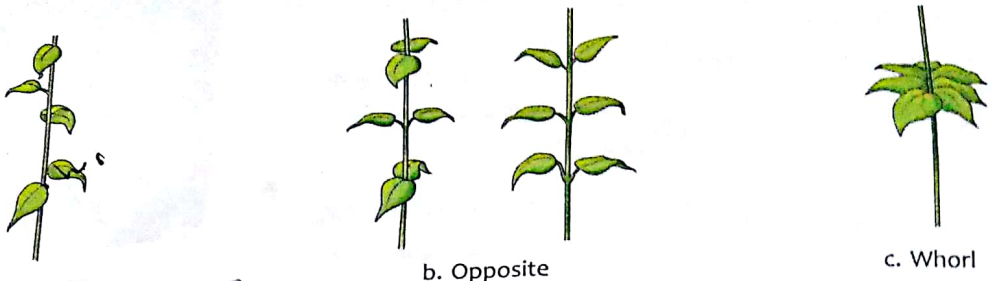



Fig. 1.6 | Arrangement of leaves

## Functions of a leaf

Leaves perform many functions such as manufacturing food, gaseous exchange and transpiration.

**Manufacturing of food** The main function of leaves is to manufacture food. Food is manufactured in the presence of sunlight by leaves that contain a green pigment called **chlorophyll**. The process by which green leaves prepare their own food by using carbon dioxide and water in the presence of sunlight and chlorophyll is called **photosynthesis**. The leaves produce glucose and oxygen from water and carbon dioxide during photosynthesis.

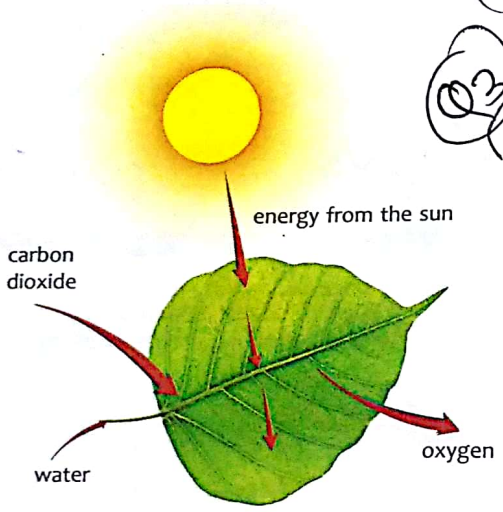



Fig. 1.7 | Photosynthesis in green plants

$$\text{Carbon dioxide} + \text{Water} \xrightarrow[\text{chlorophyll}]{\text{sunlight}} \text{Glucose} + \text{Oxygen}$$

**Gaseous exchange** Many minute pores called **stomata** are present on the lower surface of a leaf (Fig. 1.8). During daytime, plants take in carbon dioxide for photosynthesis and release the excess oxygen through the stomata. At night, plants take in oxygen and release carbon dioxide into the air through the stomata.

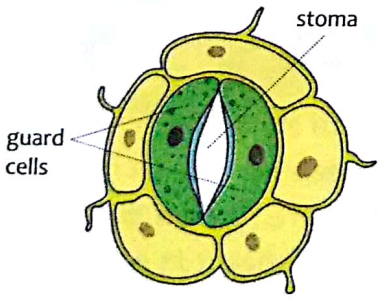



Fig. 1.8 | Stomata

**Transpiration** Excess water taken up by plants is released into the air in the form of water vapour through stomata. The process is called **transpiration**. As sweating keeps us cool, transpiration keeps a plant cool.

## Modification of leaves

Though the main function of leaves is to manufacture food, some leaves get modified to perform special functions.

### Leaf tendril to provide support

In many climbers, the leaf is modified into a thin thread-like coiled structure called a **tendril**. A tendril stretches out and

## Activity 2

Visit your school garden and identify plants with opposite, alternate and whorled type of leaf arrangements. Arrange your data in the following table.

| Name of plant | Type of arrangement of leaf |
|---|---|
| | |
| | |
| | |
| | |

twines around a suitable object to provide support to the weak stems. Leaf tendrils can be seen in pea plants (Fig. 1.9a).

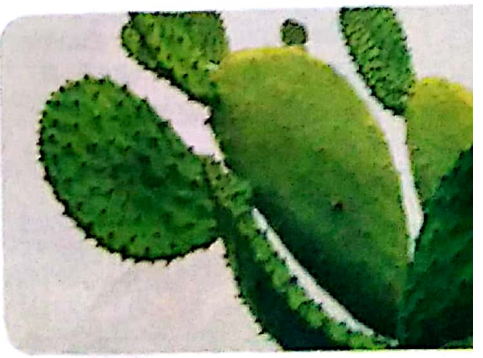
### Leaf spines to provide protection and reduce loss of water

In certain plants, leaves or parts of leaves get modified into pointed structures called **spines**. Spines help to reduce the loss of water by transpiration. They also protect the plant from grazing animals. Some examples of plants with spines are cactus (*Opuntia*) and Mexican poppy (Fig. 1.9b).

### Scale leaves to protect buds and store food and water

In some plants, the leaves are modified into scale leaves and perform the function of protecting the buds. They also store food and water. Scale leaves may be thin and dry as in ginger, or thick and fleshy as in onion (Fig. 1.9c).

a. Leaf tendrils of pea plant



b. Leaf spines of *Opuntia*

c. Scale leaves of onion

Fig. 1.9 | The leaves of some plants are modified to perform various functions.

### Check your progress

Write true or false. Correct the false statements.

1. The lamina has a thickened vein along its centre called petiole.
2. In a simple leaf, the leaf blade is clearly divided into many distinct parts called leaflets.
3. In alternate arrangement, a set of three or more leaves grows from the same node.
4. Leaf spines help to reduce the loss of water by transpiration.
5. The leaves of *Opuntia* are modified into spines.

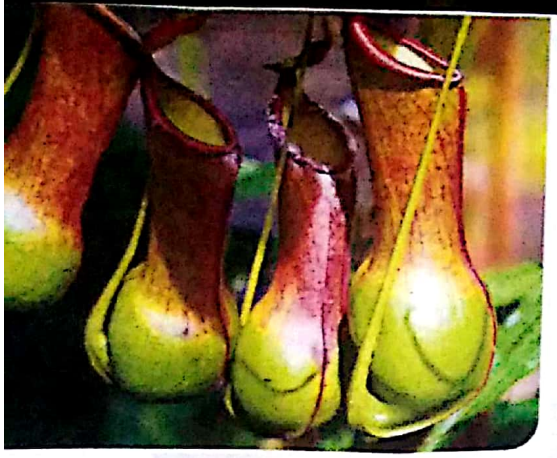


Fig. 1.10 | Pitcher plant

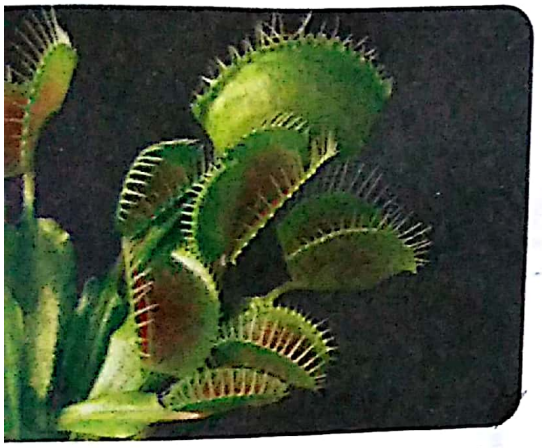


Fig. 1.11 | Venus flytrap plant

### Modifications of leaves in insectivorous plants

**Pitcher plant** The leaf of a pitcher plant is modified into a trapping device that looks like a pitcher. The pitcher has a lid, which is an extension of the leaf apex. The petiole of the leaf coils like a tendril. Once an insect enters the pitcher through the opening, the lid closes and the insect gets digested by the juices released by the leaf (Fig. 1.10).

**Bladderwort** The leaves of a bladderwort plant are highly segmented. Some of the segments are modified to form tiny bladder-like structures that have a trapdoor entrance. Organisms that enter through it cannot exit. They get trapped inside and are digested there.

**Venus flytrap** The edges of a leaf of the Venus flytrap plant have long pointed hair. The leaf blade is divided into two parts and the midrib acts as a hinge. When an insect comes in contact with it, the leaf snaps shut. The leaf secretes juices to digest the insect (Fig. 1.11).

Vegetative propagation is advantageous for plants since it is an easy and rapid method of propagation. It is also economical. Plants produced by this method are identical copies of the parent plant.

## Vegetative propagation by leaves

Some plants do not produce seeds. Also, the seeds of some plants do not germinate. Such plants grow new plants from their vegetative parts such as root, stem or leaf of a plant. This is called **vegetative propagation** or **vegetative reproduction**. Vegetative propagation is a type of asexual reproduction in plants.

In *Bryophyllum* and *Begonia*, vegetative propagation takes place by adventitious buds on leaves. These buds usually remain dormant. But under favourable conditions when the leaf falls on the ground, these buds develop into small plantlets. The plantlets then get separated from the parent plant and grow into independent plants (Fig. 1.12).

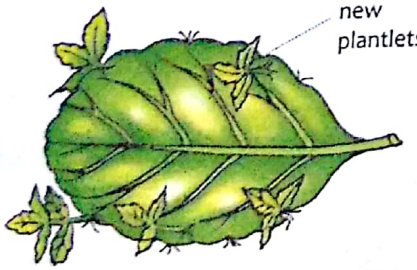
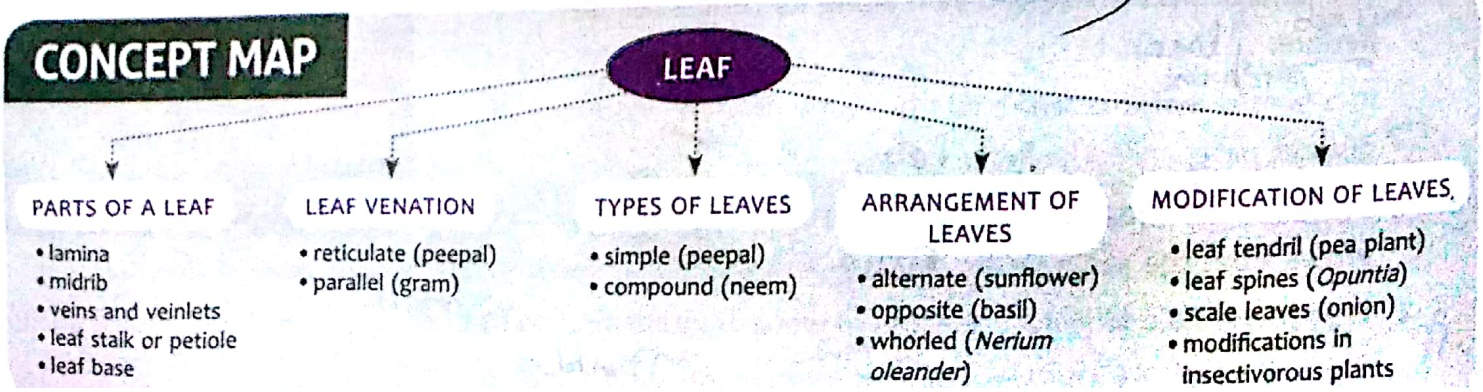
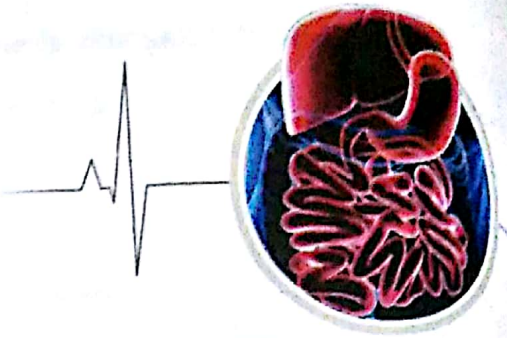



Fig. 1.12 | *Bryophyllum* leaf

### CONCEPT MAP



# 4 Digestive System in Humans



**Key concepts**

- The process of nutrition
- Organs of the digestive system
- Functions of each organ of the digestive system
- The process of digestion of carbohydrates, proteins and fats

The process by which living organisms obtain and use food is known as nutrition. You have studied in the previous classes that animals including humans depend on plants and other animals for their food. You take in large complex material as food. The food that you consume cannot be utilized as it is by your body. It must be broken down into simpler form so that it can be easily absorbed by the body. This task is done by the digestive system.

## The process of nutrition in humans

The process of nutrition occurs in five stages – ingestion, digestion, absorption, assimilation and egestion.

- **Ingestion:** In this first stage of nutrition, food is taken in through the mouth.
- **Digestion:** In the next stage, the conversion of complex food (taken in through the mouth) into a simple form occurs by the action of enzymes.
- **Absorption:** In this stage, the digested food is absorbed into the blood stream.
- **Assimilation:** In this stage, the absorbed food material is utilized by the body to provide energy, or for the growth and repair of tissues. A part of the absorbed food is also stored for future use.
- **Egestion:** In the last stage of nutrition, the undigested insoluble part of food is eliminated in the form of faeces.

Talking about unpleasant things during a meal is not good for digestion, not good for health.

BETTY JAMIE CHUNG

## The digestive system in humans

The digestive system in your body performs all the functions related to the process of taking in food, its digestion, absorption, assimilation and egestion. The digestive system in humans consists of two parts – the alimentary canal and its associated digestive glands.

- **Alimentary canal:** It is a long tube-like muscular structure that runs from the mouth to the anus. It consists of the mouth, pharynx, oesophagus, stomach, small intestine, large intestine, rectum and anus (Fig. 4.1).
- **Digestive glands:** The digestive glands associated with the alimentary canal are the salivary glands, liver and pancreas.

## The alimentary canal

**The mouth** This is where the alimentary canal begins. Food is ingested through the mouth, which opens into a small chamber called **mouth** cavity or **buccal** cavity. Its main function is to receive food and start digestion.

Before we study the course of ingested food in the alimentary canal, let us study our teeth.

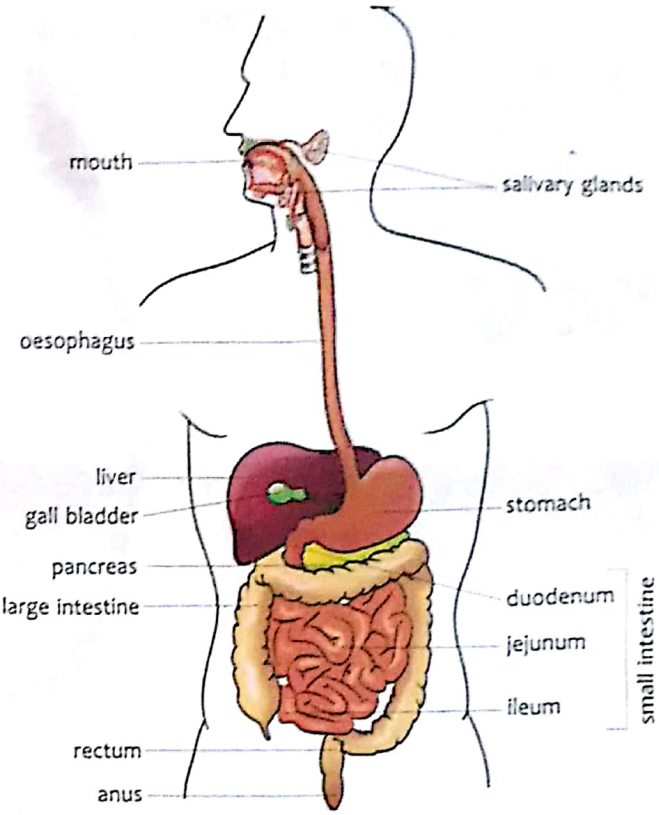


Fig. 4.1 | Digestive system and associated digestive glands

**The teeth** The teeth play an important role in mechanical digestion. Humans have two sets of teeth in their life. The first set of teeth, called the **milk teeth**, normally appears between six or seven months of age. The milk teeth are also called **temporary** or **deciduous teeth**. These are 20 in number and fall off between 6 and 12 years of age. They are replaced with a new set of teeth, which remain for the rest of the life. Therefore, they are called **permanent teeth**.

Table 4.1 Types of teeth in adult human beings

| Type of tooth | Structure | Function | Number in each jaw | Total in both jaws |
|---|---|---|---|---|
| INCISORS |  | biting/ cutting | 4 | 4 × 2 = 8 |
| CANINES |  | tearing | 2 | 2 × 2 = 4 |
| PREMOLARS |  | crushing/ grinding | 4 | 4 × 2 = 8 |
| MOLARS |  | crushing/ grinding | 6 | 6 × 2 = 12 |
| | | Total | 16 | 32 |

**Did you know?**

The last molar of each side in each jaw is also called wisdom tooth because it appears late – generally between 17 and 20 years of age, when the human body reaches maturity. However, in some people these teeth may not appear at all. This does not mean they have no wisdom!

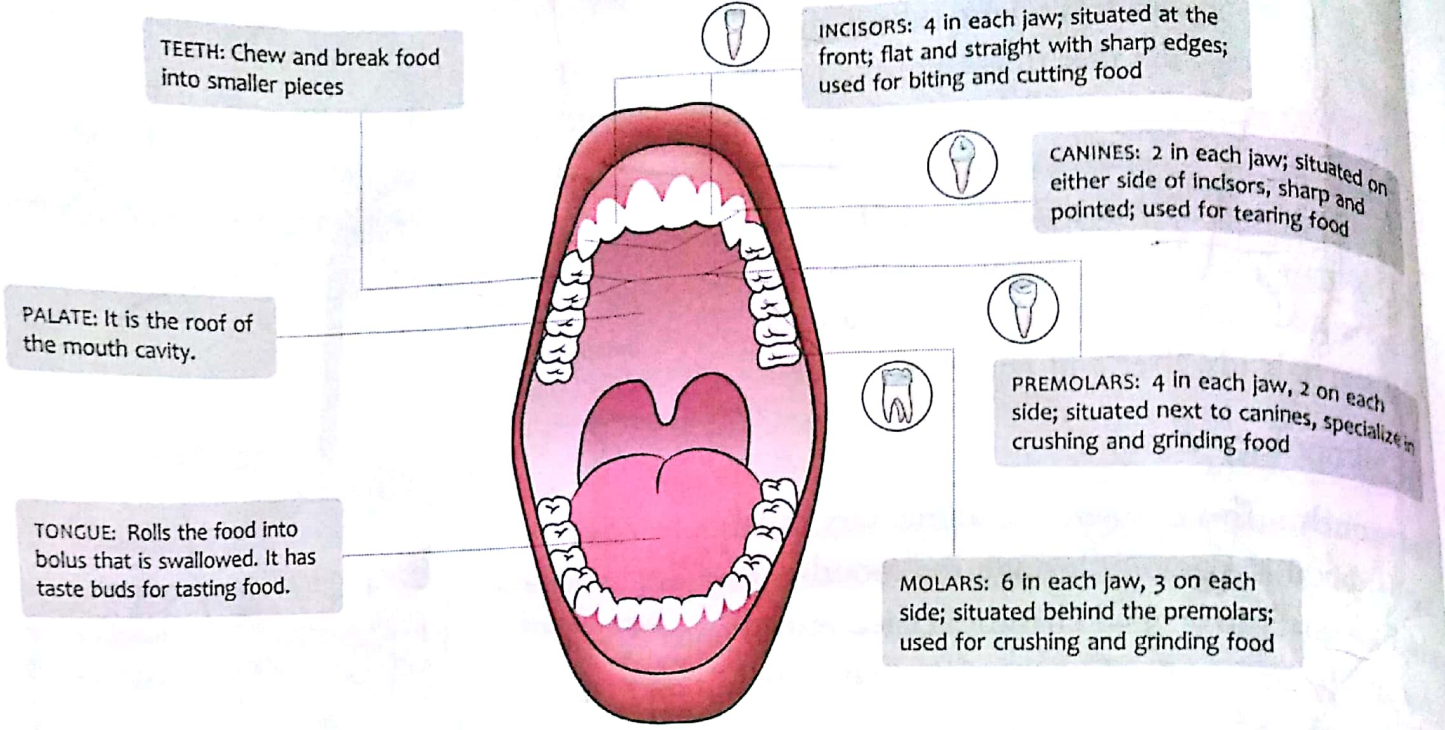



Fig. 4.2 | Mouth cavity showing different types of teeth

If you observe your teeth closely, you will find that not all of them are of the same shape and size. Some are broad, others are narrow; some are sharp, others are flat.

Humans have 4 types of teeth – **incisors, canines, premolars** and **molars** (Fig. 4.2). Table 4.1 summarizes the types of human teeth and their functions.

As a small child you had 20 temporary teeth – 8 incisors, 4 canines and 8 premolars. The molars only appear as permanent teeth later in life. If you count your teeth now, you will find that there are about 28 teeth – 8 incisors, 4 canines,

## Activity 1

**Aim:** To study the number and types of teeth in an adult human

**Materials required:** A mirror and an adult partner

**Procedure:** Observe your teeth in a mirror and count them. Note the various types of teeth. Ask your partner to open her/his mouth and count the various types of teeth.

| Your teeth | | | Adult partner's teeth | | |
|---|---|---|---|---|---|
| No. | Type | Number | No. | Type | Number |
| 1. | | | 1. | | |
| 2. | | | 2. | | |
| 3. | | | 3. | | |

8 premolars and 8 molars. On the other hand, your parents and other adults have 32 teeth of which there are 8 incisors, 4 canines, 8 premolars and 12 molars.

- **Structure of a tooth:** The general structure of all types of teeth is the same. Each tooth consists of two distinct parts – crown and root – separated by a thin narrow neck (Fig. 4.3).
- The crown is the upper visible part of the tooth.
- The root is the lower part that is embedded in a cup-like socket of the jawbone.
- The neck is surrounded by the gum.

The crown is covered with enamel. Enamel is the hardest substance in your body. Beneath the enamel is dentine, which forms the bulk of the tooth. Beneath the dentine, there is a pulp cavity which contains nerves and blood vessels.

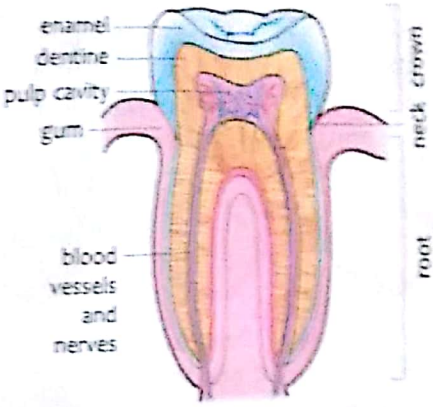


Fig. 4.3 | Structure of a tooth (premolar)

**The tongue** The mouth cavity also contains a thick muscular organ called the tongue. The tongue is covered with a mucous membrane, which keeps it moist all the time. It has taste buds that help in distinguishing tastes. It also helps in moving the food in the mouth.

**The pharynx** The mouth cavity leads into the pharynx. The digestive and respiratory systems cross each other in the pharynx (Fig. 4.5). The pharynx is the common passage for food and air from the mouth and nose to the throat. It is a wide muscular tube divided into three parts – upper, middle and lower. Only air passes through the upper part whereas both air and food pass through the middle part, and only food passes through the lower part.

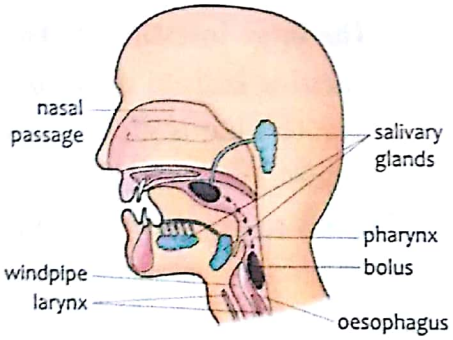


Fig. 4.5 | Passage of food through the pharynx

**The oesophagus (gullet)** The pharynx leads to the oesophagus (also called the food pipe). The oesophagus is a tube-like structure about 25 cm long, extending from the pharynx to the stomach. Food passes from the pharynx into the oesophagus, from where it moves forward by a series of muscular contractions and not by gravitational force.

### Tooth decay

The most common tooth problem among people is tooth decay. When small pieces of food get trapped between teeth, bacteria act upon them. As a result, acid is produced, which slowly damages the teeth. This is known as tooth decay or dental caries (Fig. 4.4). Many a time, a mixture of saliva, food and bacteria begins to form over the teeth within half an hour of eating. This is known as dental plaque. The bacteria in dental plaque cause infection, inflammation and decay of teeth resulting in bad breath and pain. The hardened plaque is called tartar.

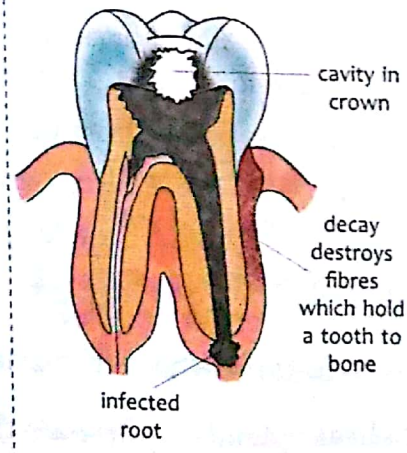


Fig. 4.4 | Tooth decay

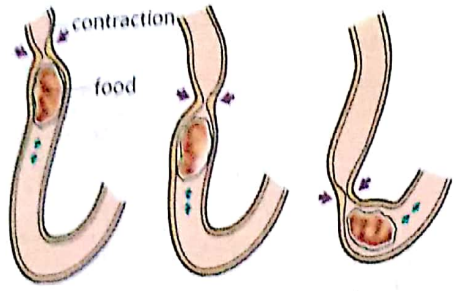



Fig. 4.6 | Peristalsis through the oesophagus

The muscles contract one after the other in a wave-like moti known as **peristalsis** (Fig. 4.6).

**The stomach** The stomach is a J-shaped muscular bag-like organ situated on the left side of the abdomen. It churns the food and mixes it with digestive juices and passes it on to th small intestine for further digestion. At the upper end of the stomach, lies the oesophagus; and its lower end opens into the small intestine. The stomach walls help in mechanical digestion. The inner wall of the stomach is lined by millions gastric glands that secrete gastric juice. This gastric juice is ri in hydrochloric acid and enzymes.

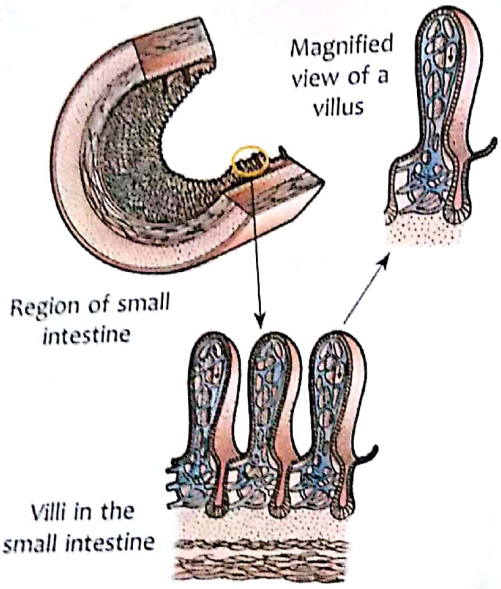



Fig. 4.7 | Internal structure of wall of the small intestine

**The small intestine** The small intestine is a long, coiled tube that lies folded in the abdomen. It is divided into three parts: **duodenum** (anterior part), **jejunum** (middle part) and **ileum** (posterior part). The inner wall of the small intestine has billions of finger-like projections called **villi** (singular: villus) (Fig. 4.7). The villi increase the surface area for the absorption of digested food.

**The large intestine, rectum and anus** The small intestine leads to the large intestine, which has a wider diameter but is shorter in length. It has three parts: **caecum**, **colon** and **rectum**. Rectum is a short tube th opens to the outside through the anus.

## Check your progress

Fill in the blanks.

1. Milk teeth are also called temporary or deciduous teeth.
2. Each adult human jaw contains 8 incisors, 4 canines, 8 premolars and 8 12 molars.
3. Food passes from the pharynx to the oesophagus.
4. Stomach is a J-shaped muscular organ.
5. Small intestine is a long, coiled tube that lies folded in the abdomen.

## Associated digestive glands

**Salivary glands** There are three pairs of salivary glands that open into the mouth cavity. These glands secrete saliva, a

**Did you know?**

An average adult generates about 1.7 L of saliva every da

liquid that helps in moistening the ingested food and in the digestion of carbohydrates. The saliva also acts as a solvent and destroys germs.

Saliva is a mixture of mucus, water and salt. It mixes with the food to form a semi-solid ball called bolus. It contains an enzyme, salivary amylase, for digesting starch.

**Liver** Liver is the largest gland inside our body. It is located in the upper right side of the abdominal cavity and is associated with the small intestine. Liver secretes **bile**, a greenish-yellow fluid that helps in breaking down large globules of fats into smaller droplets for chemical digestion. The liver also helps in regulating the blood-sugar level, and in controlling the transport and storage of carbohydrates.

**Did you know?**

Liver performs over 500 different body functions. It is capable of regenerating itself. As little as 25% of a liver that remains can regenerate into the whole organ.

**Pancreas** Pancreas is another gland associated with the small intestine. It secretes **pancreatic juice**, which helps in digestion. Pancreatic juice contains many enzymes such as the starch-digesting **amylase**, the protein-digesting **trypsin** and the fat-digesting **lipase**.

## The process of digestion

The digestive organs chemically act upon the food you eat and convert it into molecules that can be absorbed by your body. The process of converting complex food into simple, absorbable form is called **digestion**.

### Food in the mouth

In the mouth, the food is chewed by the teeth. While the food is being chewed, it is softened by the saliva secreted by the salivary glands. Saliva contains an enzyme called **salivary amylase** or **ptyalin**, which acts on starch (a carbohydrate) and breaks it into maltose.

$$\text{Starch} \xrightarrow{\text{salivary amylase}} \text{maltose}$$

The softened, slightly digested food becomes a semi-solid ball called bolus, which is swallowed.

**Did you know?**

Sometimes, when your stomach is overfilled with food, the opening at the upper end of the stomach opens due to muscular contraction that results into throwing out of contents through mouth. This is known as vomitting.

### Food in the pharynx and the oesophagus

The food is swallowed into the pharynx and then passes through the oesophagus. The muscles of the oesophagus push the food towards the stomach. No digestion takes place in the pharynx and the oesophagus.

**Think and answer**

If a person eats food while standing upside down, would it reach her/his stomach?

### Food in the stomach

The muscles of the stomach wall contract rhythmically, crushing

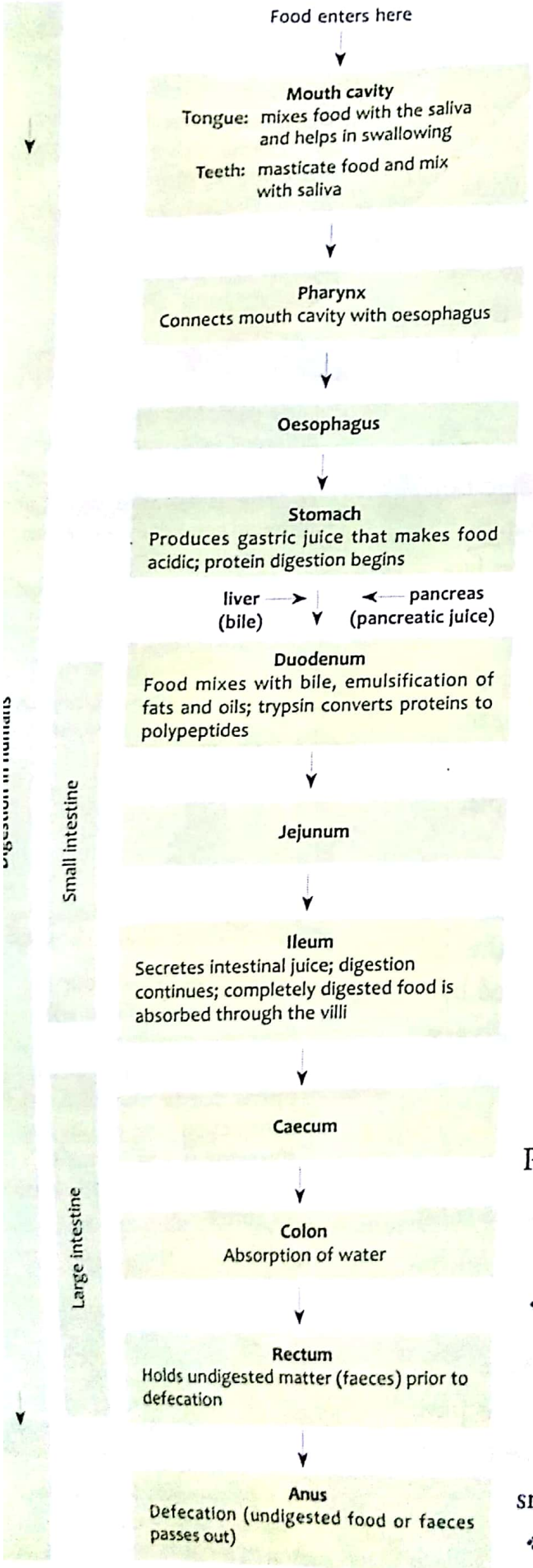



Fig. 4.8 | Path of food inside the alimentary canal

and mixing the food with gastric juice. Gastric juice kills bacteria and helps in the digestion of proteins. It contains two enzymes – **pepsin** and **renin**.

- **Pepsin** changes large protein molecules into smaller protein molecules called **proteoses** and **peptones**.

$$\text{Proteins} \xrightarrow{\text{pepsin}} \text{proteoses and peptones}$$

- **Renin** changes the milk protein (called casein) into paracasein, which is an insoluble curd.

$$\text{Casein} \xrightarrow{\text{renin}} \text{paracasein (insoluble curd)}$$

The food moves out of the stomach into the intestine in the form of a thick paste called **chyme**.

## Food in the small intestine

Further digestion of the food (chyme) takes place in the upper part of the small intestine. **Bile** from the gall bladder and **pancreatic juice** from the pancreas are received here.

- **Bile** is made in the liver and stored in the gall bladder. Although it does not contain any enzyme, bile helps in digestion by breaking down the fats into tiny droplets for the enzymes to act upon. It also provides an alkaline medium for the action of the enzymes in pancreatic juice, **trypsin** and **lipase**.
- **Trypsin** acts on proteins, proteoses and peptones and changes them into polypeptides.

$$\text{Proteins, proteoses and peptones} \xrightarrow{\text{trypsin}} \text{polypeptides}$$

These are further broken down into amino acids (smaller units of proteins).

- **Lipase** acts on fats to change them into fatty acids and glycerol.

$$\text{Fats} \xrightarrow{\text{lipase}} \text{fatty acids and glycerol}$$

Sugar (carbohydrates) are also digested in the small intestine as follows:

- **Maltase** changes maltose into glucose.

$$\text{maltose} \xrightarrow{\text{maltase}} \text{glucose}$$

- **Sucrase** changes sucrose into glucose and fructose, and lactase changes lactose into glucose and galactose.

  sucrose $\xrightarrow{\text{sucrase}}$ glucose and fructose

  lactose $\xrightarrow{\text{lactase}}$ glucose and galactose

The small intestine not only digests the food but also absorbs it. The villi in the small intestine contain blood capillaries. The digested food passes through the thin walls of these blood capillaries and enters the blood stream. This is called **absorption**.

The digestion of proteins, fats and carbohydrates is completed in the small intestine. The absorption of digested food also takes place in the small intestine.

**Key point**

The process of breaking down large fat molecules into tiny droplets for enzyme action is called emulsification of fats.

## Food in the large intestine

Some food cannot be digested and is therefore not absorbed into the blood. This food moves down to the large intestine where the excess water in it is reabsorbed. The undigested food forms faeces, which moves to the rectum and is passed out at regular intervals through the anus. This is called **egestion**.

## Assimilation

All the absorbed nutrients are not used up immediately by the body. So, they are changed into various forms that can be stored until they are needed. This is called **assimilation**.

- Glucose is converted into glycogen and stored in the liver. When required by the body, the liver converts glycogen into glucose.
- Excess of glucose is also converted into fat and stored in the adipose tissues. Fatty acids either provide energy or are stored under the skin as fat.
- Amino acids are used for the synthesis of proteins. Excess amino acids are converted into urea which is removed from the blood by the kidneys in the form of urine.

## Know your scientist

**ROBIN WARREN AND BARRY MARSHALL**

For hundreds of years, physicians thought ulcers in the stomach were caused by spicy foodstuffs. In 1982, the Australian researchers Robin Warren and Barry Marshall discovered that ulcers were caused by *Helicobacter pylori*, a bacterium which burrows into the stomach's mucosal lining. Thanks to their findings, ulcers are now treated with antibiotics. They were awarded the Nobel Prize in Medicine in 2005 for this finding.

## Check your progress

**Fill in the blanks.**

1. Saliva contains an enzyme called Salivary juice
2. Bile is made in the liver and stored in the gall bladder.
3. Glucose is converted into glycogen and stored in the liver
4. trypsin changes proteins, proteoses and peptones into polypeptides.
5. Lipase acts on fats to change them into fatty acids and glycerol

Table 4.2 summarizes the functions of various digestive enzymes.

Table 4.2 Different enzymes and their functions

| Part | Enzyme | Functions |
|---|---|---|
| MOUTH | Salivary amylase | changes starch into maltose |
| STOMACH | Pepsin | changes proteins into proteoses and peptones |
| | Renin | changes casein into paracasein (insoluble curd) |
| LIVER | No enzyme (Bile juice) | emulsification of fats |
| PANCREAS | Lipase | changes fats into fatty acids and glycerol |
| | Trypsin | changes proteins, proteoses and peptones into polypeptides |
| SMALL INTESTINE | Erepsin | changes peptones and peptides into amino acids |
| | Maltase | changes maltose into glucose |
| | Sucrase | changes sucrose into glucose and fructose |
| | Lactase | changes lactose into glucose and galactose |

**Good food habits**

- Eat a balanced diet comprising the optimum amounts from all the food groups.
- Drink an adequate amount of water.
- Eat clean and hygienically cooked food; avoid junk food.
- Do not overeat. Also do not impose strict dietary control.
- Eat at regular hours.
- Wash your hands before eating and rinse your mouth after eating.

## Indigestion

You may have sometimes experienced pain or burning in the upper part of your stomach. Or, else you may felt discomfort due to the stomach being too full. The cause of both conditions could be indigestion.

**Common symptoms of indigestion:**

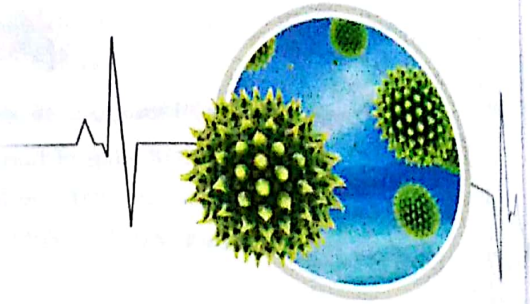
- Abdominal pain, heart burn
- Bloating (feeling of a full stomach)
- Excessive gas
- Nausea or vomiting
- Burning sensation in the stomach

**Causes of indigestion:**

- Eating very spicy or oily food
- Lying down soon after meals
- Overeating
- Drinking too much water between meals
- Drinking alcohol and sometimes cold drinks with meals

Indigestion can be prevented by maintaining healthy eating habits, eating smaller but regular meals, eating properly cooked food and avoiding fried and oily foods.

# 7 Health and Hygiene



**Key concepts**

- Definition of disease
- Types of diseases: communicable and non-communicable
- Communicable diseases: bacterial, viral, protozoal and diseases caused by worms
- Modes of transmission of diseases: air, water, food and insects
- Ways to prevent communicable diseases
- Non-communicable diseases: examples and ways to prevent them
- Hygiene: ways to keep the surroundings clean; safe disposal of garbage; healthy practices for hygiene

According to the World Health Organization (WHO), 'Health is a state of complete physical, mental and social well being and not merely an absence of a disease or infirmity'. Being healthy means having a body that is fit and a mind that is active.

Any physical or functional change from a normal state that causes discomfort or disability or affects the health of a person can be called a **disease**. Thus, disease is a deviation from the condition of good health. A disease, also called sickness or illness, can develop due to any of the following reasons:

- Infection caused by pathogens (usually microorganisms)
- Lack of consumption of a balanced diet
- Malfunctioning of one or more body parts or organs

In this chapter, you will learn about types of diseases, their modes of transmissions and different ways to prevent these diseases.

## Types of diseases

Depending on the stage of life when a person gets afflicted, diseases are of two types: congenital diseases and acquired diseases.

### Congenital diseases

The diseases that are present from birth are called **congenital diseases**. They are caused due to a genetic abnormality or underdevelopment of any organ. Some common examples of congenital diseases are colour-blindness, thalassemia and haemophilia.

Congenital diseases are inherited from the parents and are not passed on from one person to another.

### Acquired diseases

Diseases that develop after birth are called **acquired diseases**. These can be further classified into communicable and non-communicable diseases.

**Communicable (infectious) diseases** Diseases that can be passed on by an infected person to a healthy person directly or indirectly are called communicable diseases. For example, cholera, typhoid, polio, rabies, malaria and so on.

**Non-communicable (non-infectious) diseases** Diseases that are neither passed on from one person to another nor caused by pathogens are called non-communicable diseases. For example, diabetes, heart problems, kidney disorders, vitamin and mineral deficiencies. Congenital disorders also fall in this category.

## Communicable diseases

Communicable diseases are caused by microorganisms. Microorganisms that cause diseases are called pathogens. Some bacteria, fungi, viruses or protozoa are pathogens that cause diseases such as cold, influenza, malaria, chickenpox, measles and so on. These diseases spread from a sick person to a healthy person by agents such as air, water, food and insects, or by direct contact.

Some diseases caused by different pathogens are given in Table 7.1. Table 7.2. list some common communicable diseases, their causes, modes of transmission, effects and symptoms.

### Transmission of communicable diseases

Communicable diseases can spread from an infected person to a healthy person in many ways. Let us study how these diseases are spread.

**Did you know?**

Haemophilia was among the first genetic disorders discovered among human beings. It is also referred to as the 'Royal disease' as Queen Victoria of England is known to have carried a gene for haemophilia and to have passed it on to some of her descendants.

Table 7.1 Communicable diseases caused by microorganisms (pathogens)

| Microorganisms | Diseases/Conditions |
|---|---|
| BACTERIA | cholera, whooping cough, tuberculosis, tetanus, leprosy, diphtheria, pneumonia, botulism, plague |
| VIRUSES | measles, chickenpox, polio, hepatitis, conjunctivitis, influenza, rabies, mumps, AIDS, swine flu |
| FUNGI | food poisoning, ringworm, athlete's foot, dhobi's itch |
| PROTOZOA | amoebic dysentery, malaria, sleeping sickness |
| WORMS | taeniasis, elephantiasis, ascariasis |

Table 7.2 Communicable diseases: causes, transmission, effects and symptoms

| | Disease | Modes of transmission | Parts affected | Effects and symptoms |
|---|---|---|---|---|
| BACTERIA | TUBERCULOSIS | Air | Lungs or any body part | For lungs, coughing and chest pain; symptoms vary for other parts |
| | TYPHOID | Contaminated food, water and direct contact of contaminated faeces | Stomach and intestine | Stomach pain, loss of appetite, constipation, cough, headache |
| | CHOLERA | Contaminated food, water | Stomach and intestine | Vomiting, acute diarrhoea, extreme thirst, muscle cramps |
| | BOTULISM | Improperly canned food | Nervous system | Fatigue, dizziness, muscular weakness, paralysis |
| | DIPHTHERIA | Air droplets and use of articles of infected person | Throat, upper trachea | Sore throat, pain, fever, hoarseness, nasal discharge |
| VIRUS | INFLUENZA | Air droplets | Upper respiratory tract | Fever, body ache |
| | POLIOMYELITIS | Food and water contaminated with infected faeces, and person to person contact | Nervous system | Irreversible paralysis in the limbs after the virus attacks the nervous system |
| | HEPATITIS | Contaminated food and water (indirect contact). Blood of infected person, tattoo, needles (direct) | Liver | Jaundice, fever, nausea, headache, pain in liver, reddening of hands and feet |
| | CHICKENPOX | Direct contact with infected person, and air droplets | Skin | Onset of fever, itchy rashes with pink spots and tiny blisters that dry and become scabs after 4–5 days |
| | COMMON COLD | Air droplets | Upper respiratory system | Watery eyes, dry throat, headache, runny nose |
| | MEASLES | Droplet infection through coughing, sneezing and spitting | Skin | Sore throat, runny nose, watery eyes, dry cough with fever; small whitish spots appear on the inner walls of the cheek; red rashes appear first in the neck region and then the whole body |
| FUNGUS | RINGWORM | Direct contact | Skin | Red, itchy, scaly, or raised patches; patches may develop blisters; patches may be redder on the outer edges or resemble a ring |

### Through air – droplet infection

The germs of some diseases are present in the windpipe, nasal passage, throat and mouth of the person suffering from the disease. A sneeze or cough from an infected person releases a mist of droplets full of microbes into the air (Fig. 7.1). When other people inhale this air, microbes enter their body and infect them. Cold, influenza, tuberculosis, measles and diphtheria are some infections that spread through air.

Fig. 7.1 | A sneeze or cough can spray a mist of germs.

### Through food and water

Diseases such as typhoid, dysentery, cholera and other intestinal infections spread through contaminated water. Such diseases are called **waterborne diseases.**

Water may get contaminated when infected people bathe, wash or defecate near sources of water. When contaminated water gets mixed with drinking water, it causes infections. Microbes causing infections of the ear, nasal passage and throat commonly spread through swimming pools.

- Drinking water should always be stored in clean and covered utensils to avoid contamination.
- Swimming pools should have an efficient filtering system to clean the water regularly.

Fig. 7.2 | Housefly and mosquito spread diseases.

### By insects and other animals – vectors

Heaps of waste and stagnant water serve as breeding grounds for insects such as flies, mosquitoes and fleas. Microbes get attached to these insects when they visit a source of infection. When these insects sit on exposed food items or open wounds on a person's skin or bite them, they transfer the germs and thus, the infection. Animals such as rats, pigs, dogs, ticks and mites can also transfer microbes from infected people to healthy ones. These insects and animals that carry disease-causing germs are called **vectors** (Fig. 7.2 ).

Table 7.3 lists some diseases that are spread by vectors.

### Through direct contact

Some infections such as conjunctivitis and scabies (Fig. 7.3) spread through direct contact between a healthy and an infected person. Sharing things such as drinking glasses, towels and combs used by an infected person can also spread the infection. These are called **contagious diseases.**

Fig. 7.3 | Scabies

Table 7.3 Some common vector-borne diseases with their effects and symptoms

| Disease | Pathogen | Vector | Effects and symptoms |
|---|---|---|---|
| MALARIA | *Plasmodium* (protozoan) | Female *Anopheles* mosquito | Periodic fever with chills, red blood cell count drops |
| DENGUE | DENV (virus) | *Aedes* mosquito | High fever, haemorrhage, drop in platelet count |
| YELLOW FEVER | Yellow fever virus | *Aedes* mosquito | Fever, jaundice, vomiting |
| AMOEBIC DYSENTERY | *Entamoeba* (protozoan) | Houseflies | Abdominal pain, severe diarrhoea, blood and mucus in faeces |
| SLEEPING SICKNESS | *Trypanosoma* (protozoan) | Tse-tse fly | Fever, rash, fatigue; affects lymph and nervous systems, mental deterioration, increased sleep |
| FILARIASIS | *Wuchereria bancrofti* (roundworm) | *Culex* mosquito | Thickening of skin and swelling in arms, legs, genitalia, due to retention of fluid in tissues |
| PLAGUE | *Yersinia pestis* (bacteria) | Rat flea | Swollen painful lymph nodes in groins, neck or armpits; sudden fever and chills, headache |
| RABIES (HYDROPHOBIA) | *Rhabdovirus* | Saliva of infected animals (dogs) | Attacks the nervous system, leads to mental depression, convulsions, spasms and paralysis |

**Key points**

- Diseases that spread through the air are called droplet infections or air-borne diseases.
- Diseases that spread through contaminated water are called water-borne diseases.
- Diseases that are transmitted by direct contact are called contagious diseases.
- Diseases caused by microbe-carrying organisms are called vector-borne diseases.

## Prevention and control of communicable diseases

Communicable diseases can be prevented by maintaining personal and community hygiene and avoiding unhealthy habits and lifestyle.

- Drink filtered or boiled water (let the water boil for at least 15 minutes).
- Make sure there is no stagnant water near your house as mosquitoes breed quickly in such water.
- Keep food covered and do not eat exposed food items.
- Keep garbage bins covered.
- Keep personal articles used by a patient separate. Do not let others share them.
- Use your own towel and handkerchief.
- Wash your hands with soap before eating.
- Cover your nose and mouth with a tissue paper or handkerchief when you sneeze or cough.
- Drink pasteurized milk or boil it thoroughly before drinking.
- Avoid direct contact with a patient suffering from a highly contagious disease such as chickenpox or measles.

Activity

Conduct a survey among 20 children to find how often they consume food from roadside vendors. Record your findings in a table as shown below.

| Name | Frequency of eating food from roadside vendor (put a tick in the correct column) | | | | |
|---|---|---|---|---|---|
| | Never | Rarely | Once/twice in a week | More often | Have you ever suffered from illness after consuming that food (yes/no) |
| | | | | | |

What do you conclude from the survey? Do you see any connection between eating out and falling ill?

- Vaccination is an additional way of boosting immunity against specific diseases such as chickenpox, hepatitis, poliomyelitis and so on.

### Ways to prevent food poisoning

- Rinse vegetables and fruits in running water before consumption.
- Cook food properly, especially meat to kill germs.
- Do not leave food uncovered and outside the refrigerator for more than two hours in summer.
- Leftover food should be kept in a refrigerator immediately.
- Do not consume food items from roadside vendors.
- Keep bags containing meat, fish and poultry products away from vegetarian items to prevent contamination.
- Do not eat stale food.

**Did you know?**

A vaccine is a biological preparation made from weakened or killed forms of disease-causing microorganism that improves immunity to a particular disease. Some common vaccines are BCG vaccine for tuberculosis, DPT vaccine for diphtheria, pertussis and tetanus and MMR vaccine for measles, mumps and rubella.

## Non-communicable diseases

Diseases that are not caused by pathogens and are not infectious are called **non-communicable diseases.** They may be caused either due to deficiency of certain nutrients in the diet or due to malfunction of certain organs because of old age or problems in metabolism. Non-communicable diseases can be broadly grouped as under:

- Nutritional deficiency diseases
- Organ malfunction diseases
- Allergies
- Bites and stings

**Key point**

*Diseases caused due to lack of one or more nutrients in the diet are called deficiency diseases.*

child affected with kwashiorkor | healthy child | child affected with marasmus

*Fig. 7.4 | Protein-energy malnutrition*

### Nutritional deficiency diseases

Inadequate amount or lack of specific nutrients in the diet causes **deficiency diseases**. If a person does not eat sufficient quantity of balanced food, she or he is said to be **undernourished**. At times, a person may consume enough food but it may lack one or more nutrients causing **malnutrition**. For example, protein energy malnutrition (Fig. 7.4).

**Protein-energy malnutrition** is a condition in young children (between 1 and 5 years) affected by the deficiency of proteins or carbohydrates and fats or all of these in their diet. It may lead to two diseases – **kwashiorkor and marasmus**.

- **Kwashiorkor:** A diet poor in protein during infancy and childhood results in a condition called kwashiorkor. It is marked by the following symptoms.
  - stunted growth and mental retardation
  - frequent diarrhoea
  - water retention (oedema)
  - bulging eyes
  - protruding belly
  - thin stick-like legs
  - discolouration of hair
- **Marasmus:** It occurs when children below one year do not get adequate amount of proteins and carbohydrates. They show the following symptoms.
  - prominent ribs
  - dry, thin and wrinkled skin
  - mental retardation
  - lean and weak body

**Vitamin and mineral deficiency diseases** Vitamins and minerals are needed in very small quantities to ensure proper

*Table 7.4 Vitamins, their deficiency diseases and sources*

| Vitamin | Deficiency disease | Vitamin sources |
|---|---|---|
| A | Night blindness | all yellow fruits (papaya, mango), vegetables, fish and egg |
| B | Beriberi | yeast, unpolished rice, eggs |
| $B_{12}$ | Anaemia (low RBC count in blood) | meat and fish |
| C | Scurvy (gums swell up and bleed) | citrus fruits, tomato, leafy vegetables, gooseberry (*amla*) |
| D | Rickets (bones become soft and bent) | milk, eggs, liver, skin makes it under sunlight |
| E | Skin and reproductive system is affected | wheat germ (embryo), milk, vegetable oil, fish, meat |
| K | Excessive bleeding (haemorrhage) | green leafy vegetables (cabbage, spinach), soybean |

Table 7.5 Some minerals, their need in the body, deficiency diseases and sources

| Mineral | Needed for | Deficiency diseases | Sources |
|---|---|---|---|
| CALCIUM | bones, teeth and blood clotting | rickets (soft bones) | milk, eggs, fish and green vegetables |
| PHOSPHORUS | strong bones and teeth | bad teeth and bones | milk, meat, nuts, beans and grains |
| IRON | formation of haemoglobin | anaemia | green leafy vegetables, egg yolk and liver |
| SODIUM | healthy nerves and water balance in the body | muscular cramps | table salt and seafood |
| IODINE | production of thyroxine, general metabolism | goitre (enlargement of thyroid gland) | iodized salt and seafood |
| POTASSIUM | nerves and muscles | muscular weakness, paralysis | banana, milk, vegetables and meat |
| CHLORINE | nerves and enzyme action | weakness, dehydration | salt, fruits, cereals |

functioning of various processes. Each vitamin and mineral has a specific function to perform and their deficiency could lead to deficiency diseases.

Tables 7.4 and 7.5 highlight various deficiency disorders pertaining to vitamins and minerals.

## Organ malfunction diseases (degenerative diseases)

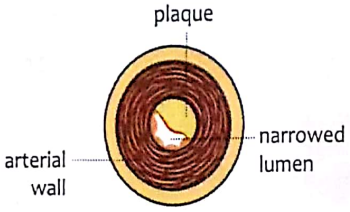
Certain health issues or diseases occur due to malfunctioning of some body organs such as heart, kidneys and pancreas as a result of impaired metabolism or improper hormonal secretions. Some common organ malfunction disorders are diabetes, heart and renal problems.

**Diabetes mellitus** is caused by inadequate secretion of insulin by pancreas. Insulin regulates the level of glucose in the blood by helping the liver to convert excess glucose into glycogen and store it. In diabetic patients, the body can neither use sugar nor store it in the liver. As a result, their blood contains extra sugar but other tissues lack it. Major symptoms of diabetes include fatigue, loss of weight, excessive thirst and frequent need to urinate. Diabetes can lead to malfunction of other organs such as kidneys and heart.

Diabetes mellitus patients are given insulin injections or medication depending on their condition. There is a tendency

Diabetes mellitus is also called Type 1 diabetes. In recent years, a Type 2 diabetes condition is emerging among people of all ages due to ineffective use of insulin secreted by the pancreas. According to the World Health Organization (WHO), almost 90 per cent of diabetic people suffer from Type 2 diabetes that can be traced to physical inactivity and obesity.

**Atherosclerosis** is a disease in which plaque builds up along the inner lining of arteries making them hard, thick and rough.
It decreases their internal diameter, thus, reducing the flow of blood to various organs, raising the blood pressure. Depending on the arteries that are affected, it could lead to coronary artery disease (heart) or carotid artery disease (to brain) or chronic kidney disease.




a. Rheumatoid arthritis

b. Osteoarthritis

Fig. 7.5 | Arthritis is a disease affecting the joints.

**Think and answer**

Radha's grandmother cannot walk properly due to stiffness in her knee joints, which can't bend easily. What kind of arthritis is it?

for this disease to run in families. It can develop at any age. It can be prevented with 30 minutes of moderate exercise daily and a healthy diet.

**Heart diseases** Disorders of the heart and blood vessels are directly related to diet and the way of living. A sedentary lifestyle, fat-rich diet leading to weight gain and stress are major causes of heart malfunctions such as the following.

- **Coronary heart disease:** It occurs when the heart muscles do not get enough oxygen due to a reduction in blood supply following deposits of plaque or atherosclerosis in the coronary (heart) arteries. It can lead to angina or temporary chest pain.
- **Heart attack:** Coronary artery disease (CAD) leads to a heart attack. It occurs when a part of the heart muscle is suddenly deprived of its blood supply due to complete blockage in the artery feeding it.

**Alarm bells for us!**
About 45 million Indians suffer from coronary heart disease (CHD). By 2020, India is feared to have the highest number of heart patients in the world.

**Renal diseases** These occur when the kidneys are unable to efficiently filter wastes such as urea, uric acids, water and salts. Thus, they get accumulated in the blood, preventing removal of additional wastes from the cells. Patients with malfunctioning kidneys need periodic dialysis to remove waste or kidney transplants.

**Arthritis** It is a disease of the joints. It is of two types: rheumatoid arthritis and osteoarthritis.

- **Rheumatoid arthritis** is characterized by swelling, pain and stiffness in the joints, especially the middle joints of the fingers, which may get twisted (Fig. 7.5a).
- **Osteoarthritis** is caused by the breakdown and eventual degeneration of cartilage at the joints due to ageing, heredity or injury. It is marked by stiffness and pain in the affected joints such as the hips, knees (Fig. 7.5b) and spine.

**Cancer** It is defined as an uncontrolled growth of some abnormal cells in any part of body that invades other normal tissues. A growing mass of cancerous cells is called a **malignant tumor** (Fig. 7.6). Cancers are generally named after the organ in which they originate.

The basic cause of cancer is unknown but conditions that may lead to it include overexposure to ultraviolet rays of the sun, nuclear radiation, contact with certain chemicals and smoking or chewing tobacco.

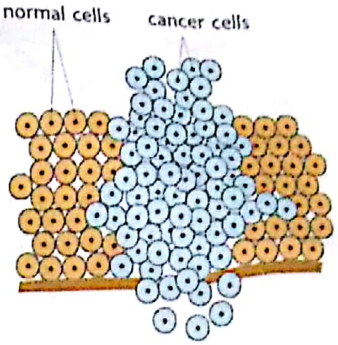



Fig. 7.6 | Cancer is an uncontrolled growth of cells.

**Allergy**

An allergy is an unusual hypersensitivity of body tissue to certain substances. The substances that trigger an allergy are called **allergens**. They may be certain foods, drugs, cosmetics, dust, pollen grains or perfumes. An allergic reaction can occur when allergens are inhaled or taken into the body through the mouth or direct skin contact. Asthma, eczema and hives are some of the diseases caused by allergic reactions.

Fig. 7.7 | Allergy causes redness of skin.

**Bites and stings**

Bites and stings of certain animals and insects such as snakes, spiders and canines are a cause of great discomfort. They can result in vector-borne diseases as you have learned, which need immediate medical treatment. For example, the bite of a poisonous snake can be fatal if not treated promptly. Poisonous snakes contain venom, which affects the nervous or circulatory systems.

**@ Weblink**

To know more about cancer, visit rsgr.in/icb8-7.

**Fever**

Fever itself is not a disease but is indicative of a disease. Fever occurs when a person suffers from a disease or infection.

Fever often occurs when there is inflammation or swelling in any part of the body, or when toxins or some foreign bodies enter the bloodstream. The normal temperature of human beings is considered to be 98.4 °F or 37 °C. When there is a rise in body temperature from the normal value, it is termed as fever. The pulse or heart rate also increases during fever. Rise in body temperature above 105 °F or its fall below 96 °F are both dangerous.

**Did you know?**

A fever is caused by your body to inhibit the growth of bacteria, virus and other germs and not by the 'germs' themselves.

## Check your progress

Match the columns.

| | |
|---|---|
| 1. anaemia | a. deficiency of vitamin A |
| 2. night blindness | b. deficiency of vitamin B |
| 3. rickets | c. deficiency of iodine |
| 4. beriberi | d. deficiency of vitamin C |
| 5. scurvy | e. deficiency of iron |
| 6. goitre | f. deficiency of vitamin D |

Fig. 7.8 | Remaining clean is good for health.

## Cleanliness and hygiene

Many diseases can be avoided by maintaining cleanliness and hygiene within and around yourself and by taking simple precautions such as the following.

### Personal hygiene

Besides eating a balanced diet, it is important to protect yourself from diseases by keeping your body and surroundings clean. A healthy lifestyle and cleanliness are essential to keep healthy. **Personal hygiene** is the practice of keeping yourself clean. By following a few good habits, you can keep yourself clean (Fig. 7.8).

#### Care of skin, hands and hair

- Bathe regularly to remove sweat and dirt. It keeps the skin clean and free from disease-causing germs.
- Wear clean clothes, particularly socks and undergarments. As these clothing items are next to your skin, dead cells and germs get accumulated there.
- Washing hands is the simplest and most effective way to prevent infections. Therefore, you should wash your hands before and after meals, after using the toilet, after touching any animal or equipment, or any contaminated objects such as dustbins.
- Wash your hair with soap or shampoo at least once a week to keep your hair and scalp clean. This prevents the formation of dandruff and keeps lice away.
- Massage your hair and scalp with oil regularly. It improves blood circulation and keeps your hair shining.
- Combing hair daily helps in getting rid of dust.
- Keep your nails trimmed and clean to avoid accumulation of germs and dirt.

**Did you know?**

Health care experts advise scrubbing hands vigorously for at least 15 seconds with soap and water. This helps wash away diarrohea and allergy-causing germs.

### Oral hygiene

Oral hygiene involves keeping the mouth and teeth clean and avoiding tooth decay. You can do this by

- brushing your teeth at least twice daily and rinsing your mouth after every meal.
- eating crunchy vegetables such as radish and carrot that scrub your teeth as you eat.
- making milk, cheese and curd part of your daily diet, as these are rich in calcium and make bones and teeth strong.
- avoiding excess of chocolates and toffees.

Tooth decay is caused by the action of microorganisms on food particles that get stuck between the teeth and form a sticky film called plaque. Microbes in plaque act on sugary food and make strong acids, which form cavities leading to tooth decay.

Fig. 7.9 | Brush your teeth twice daily.

### Eye care

Eyes are among the most delicate of your sense organs. You need to protect them from dust and infections such as conjunctivitis and trachoma. Eating vegetables such as spinach, carrot, cabbage and fruits such as mango and papaya is good for the eyes. Eyes have their natural defence mechanism: **eyelashes** protect them from dust and dirt, **tears** help wash out the dirt and **eyelids** close when any object gets too close to the eyes.

Table 7.6 highlights some dos and don'ts for protecting your eyes.

Fig. 7.10 | Maintain proper eye distance when working on a computer.

**Did you know?**

Myopia and hypermetropia are two common eye diseases. In myopia people cannot see clearly distant objects. In hypermetropia, disease in people cannot see clearly nearby objects.

Table 7.6 Dos and don'ts in eye care

| Dos | Don'ts |
|---|---|
| Splash your eyes with clean water 2 or 3 times a day. | Avoid rubbing your eyes as it may damage them. |
| Maintain proper eye distance when working on a computer. | Do not read in dim light, moving vehicles or while lying down. |
| Wear sunglasses on bright, sunny days for protection against the glare of the sun. | Do not watch television or work on a computer for long periods. Take a break after every 20 minutes. |
| Look outside at distant objects to reduce strain on your eyes. | Do not see an eclipse with the naked eyes. |
| If you have a problem reading from the blackboard or a book, visit an eye specialist. | Do not try to clean your eyes with any object. Ask an adult to help you if something gets into your eyes. Blink quickly to start the flow of tears. |

## Community hygiene

A clean environment helps people to stay healthy. Apart from maintaining personal hygiene, you must keep your surroundings clean. All programmes and activities aimed at improving public health come under community health or community hygiene. Some common community hygiene programmes are:

- Provision of safe drinking water
- Disposal of wastes and their treatment

Panchayats (in villages) and municipalities (in towns) are responsible for these programmes.

### Provision of safe drinking water

Clean drinking water is one of the basic requirements for good health. Water can be made safe for drinking by some of the following methods:

- **Adding chlorine tablets** to water kills microorganisms.
- **Using alum crystals:** If the water is muddy, a crystal of alum can be used to settle fine soil particles, which can be filtered off later.
- **Sedimentation:** Storing water in storage cans or earthen pots removes suspended impurities in water by allowing them to settle down. This is called **sedimentation**.
- **Boiling:** The surest method of having germ free water is to boil it for at least fifteen minutes. Boiling kills germs.
- **Using water filters and RO systems:** These days water filters with techniques such as porous carbon candles, passing ultraviolet radiation through water, reverse osmosis (RO systems), and so on enable us to get germ-free water.

### Disposal of wastes and treatment

Proper disposal of wastes and their treatment contributes to clean surroundings and to overall public health. It is the responsibility of civic bodies to ensure proper collection of wastes from households, offices, industries and other places. Various methods adopted for proper disposal of waste and their subsequent treatment are as follows:

- **Sewage disposal and treatment:** Waste water from the kitchens and toilets of houses and other places are carried through underground sewers.

Most cities have treatment plants to treat sewage before allowing it to flow into water bodies (Fig. 7.12).

- **Garbage collection and dumping:** Civic bodies also make arrangements for the collection of garbage and its proper disposal. It is then dumped in pits in low-lying areas situated away from human habitation. When full, these pits are covered by soil so that garbage cannot be scattered by animals. Sometimes parks, shopping malls and other buildings are built on these dumping grounds after many years.

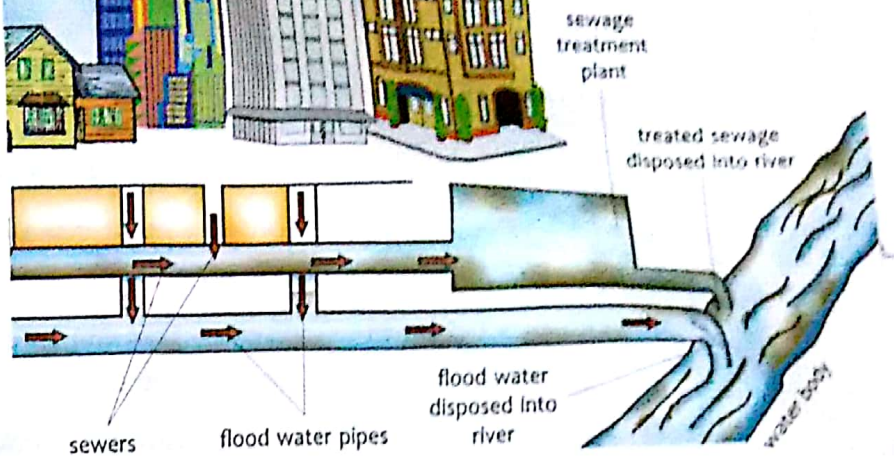


Fig. 7.12 | Sewage treatment plant

- **Composting:** Kitchen and garden waste can be decomposed naturally by dumping it into pits covered with soil. Microorganisms present in the soil decompose this waste into manure-rich soil or **compost** (Fig. 7.13). This method is called **composting**. Sometimes, earthworms are added to these pits to speed up the process of decomposition of waste into compost. This is called **vermicomposting**.


Fig. 7.13 | A compost pit

## Now you know

- Depending on the stage of life when a person gets afflicted, diseases are of two types – congenital and acquired. Congenital diseases are those that a person is born with. Acquired diseases can be communicable or non-communicable.
- Communicable diseases are caused by viruses, bacteria, protozoa, fungi and worms. Malaria, diphtheria, tuberculosis, influenza, AIDS, dysentery, cholera and whooping cough are some communicable diseases.
- Non-communicable diseases are caused either due to the deficiency of nutrients or malfunctioning of an organ. Allergies, bites and stings and congenital disorders are also non-communicable diseases.
- Diabetes is caused due to insufficient secretion of insulin by the pancreas.
- A sedentary lifestyle, fat-rich diet leading to weight gain and stress are major causes of heart malfunctions such as coronary heart disease and heart attack.
- Arthritis is a disease of the joints. It can be rheumatoid arthritis or osteoarthritis.
- Cancer is an uncontrolled growth of cells in the body that invade other tissues.
- Allergy is a hypersensitive reaction of body tissues to allergens such as certain foods, drugs, cosmetics, pollen grains, dust and perfumes. Asthma is also a type of allergy.
- Diseases can be prevented by following good hygienic personal habits, by keeping your surroundings clean and by eating a balanced diet.

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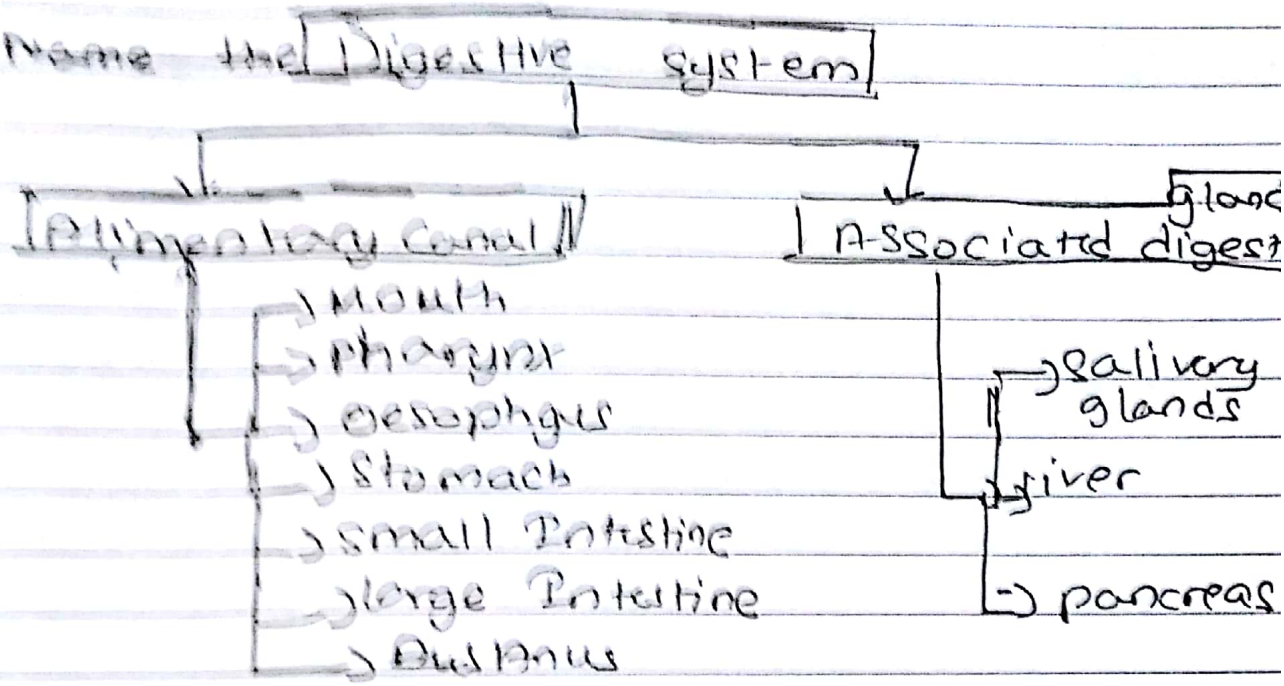
Q1) Name the various parts associated with human digestive system.

Ans) Name the Digestive system




Q2) What is digestion?

Ans) The process of breaking down of coplex food meterials into the simpler form by the action of enzymes, so that they can be oxidised and easily absobed by the body cells is called as digestion

Q3) Can write the differences between nutrition and digestion.

| Nutrision | Digestion |
|---|---|
| 1) Nutrision is the overall process by which living organism obtain food and use it | Digestion is the process of breaking down of the consume food into simpler forms, so that |

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| | |
|---|---|
| for its growth and repair | it can be easily absorbed by our body |
| 2) It is a combination of various process like like Ingestion, digestion, absorption, assimilation and Egestion | 3) Digestion is the second stage of nutrition |

write the differences between digestion and absorption.

| Digestion | absorption. |
|---|---|
| 1) It is the process of breaking down of complex ingested food into simpler soluble form by the action of enzyme | 1) It is the process by which digested food is absorbed into our blood stream |
| 2) It is the second stage of nutrition | 3) It is the third stage of nutrition. |

write the differences between digestion and assimilation

| Digestion | assimilation |
|---|---|

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| | | |
|---|---|---|
| 1) | It is the process of breaking down of complex ingested food into simpler soluble form by the action of many enzymes | 1) It is a process by which absorbed food material is utilized by the body to provide energy ~~food~~ for the growth and repair of tissues |
| 2) | It is the second stage of nutrition | It is the forth stage of nutrition |

Write the differences between small intestine and large intestine.

| | Small intestine | large intestine |
|---|---|---|
| 1) | It is a long, coil tube that lines folded in the abdomen between the stomach and large intestine | 1) The small intestine leads to the large intestine, which has a wider diameter but is shorter in length |
| 2) | It is divided into three parts :- Duodenum Jejunum and ilium | 2) It is divided into three parts - caecum Colon and Rectum |
| 3) | Most of the chemical digetion takes place her | 3) It has no digestive function but helps in absorbing water and in |

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| | |
|---|---|
| and the nutrients from the digested food is absorbed into the blood stream from her | removing undigested solid waste through the anus |

write the differences between mancal digetion and chemical digetion

| mancal digetion | Chemical digetion. |
|---|---|
| It is macanical breakdown of large food particles into smaller digetable particles | 1) Chemical breakdown of ~~fat~~ complex food particles to simpler substances |
| 2) It is driven by chewing action of teeth and macular action of wall of stomach | 2) It is driven by various enzymes and acids ~~eich~~ secreated by the alimentary canel |
| 3) It occurs from mouth to stomach | 3) It occurs from mouth to small intestine. |
| 4) It increases surface area of food particles for the enzymes to act in Chemical digetion | 4) It enhances absorbtion of nutrients by breaking complex food particles to smaller molecules |

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study the dig diagram and ~~label~~ the
following part. book pg - 39

What happen to the nutrients absorbed in the blood stream from the small intestine?

After the nutrient are absorbed in the blood stream from small intestine, the nutrients are transported to tissue cells through blood. Then the absorb nutrients are utilized by the body to provide energy or for the growth and repair of tissues. A part of the absorb food is also stored for future use

Ste