

FOOD AND ITS COMPONENTS

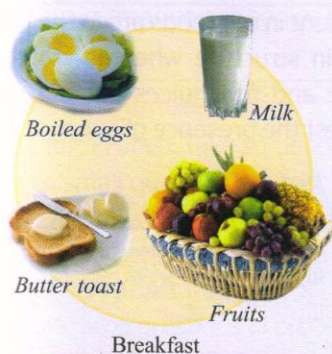
NOTE FOR THE TEACHERS

- Make them aware about different nutrients essential for proper growth and functioning of their body.
- The necessity of different nutrients in correct proportion for proper growth, functioning and maintenance of the body may be highlighted and emphasised upon repeatedly in order to inculcate good eating habits in the students.
- By collecting information related to their eating habits, they may be helped to know whether their foods contain all essential nutrients.
- They may also be helped to distinguish between health-centred food and taste-centred food.
- The importance of eating balanced diet deserves to be highlighted through charts of deficiency diseases.
- The students may themselves carry simple tests for testing presence of starch or fats in small groups using their own foods.
- Test for proteins may be shown to the students as teacher demonstration.

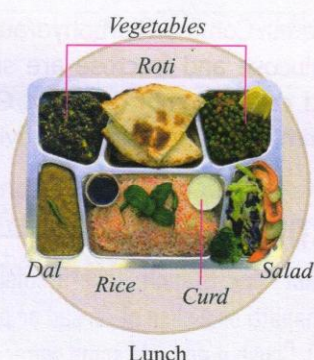
Key Learning Points

- Every organism needs food to provide essential nutrients.
- Different nutrients present in common foods.
- Function of different nutrients for the body.
- Classification of food on the basis of its function for the body.
- Testing of presence of different nutrients in common food items.
- Dietary fibres and water.
- Balance diet and its importance.
- Deficiency diseases.

Have you ever thought why we generally take different food items during different times of the day or on different days? Sometimes we take only bread, butter or parantha, egg or milk. **At other times** we take roti/rice, dal, salad, vegetables or curd. **At another time** we take rice, sambar, fish curry, vegetable and pickle. **At times** we take only fruits. What difference will it make to the body if we eat the same food at all times or on all days? Why do your parents insist that you take enough milk and fruits? Why do the dieticians suggest that we should regularly take leafy green vegetables, fruits, lot of water and a balanced diet? What is a balanced diet? Why is it essential to have good eating habits? This chapter will help you to get answers to all these questions and many more.



Breakfast



Lunch



Dinner

COMPONENTS OF FOOD

The food we eat is made up of more than one ingredients. The popular dish '*Kheer*' contains rice, milk and sugar. Similarly, dosa is made up of rice, dal, oil and salt. The ingredients of all such food items contain components which are needed by our body. These components are called **nutrients**. The nutrients are chemical substances needed by our body for proper growth and functioning.



Your Wisdom

Why is it considered essential to take a variety of foods on different days?

The main nutrients are known as **Carbohydrates**, **Proteins**, **Fats**, **Vitamins** and **Minerals**. In addition to these nutrients, our body also requires roughage and water for its better functioning. Different foods we eat contain these nutrients in different proportions. Let us learn more about these nutrients and their usefulness for our body.

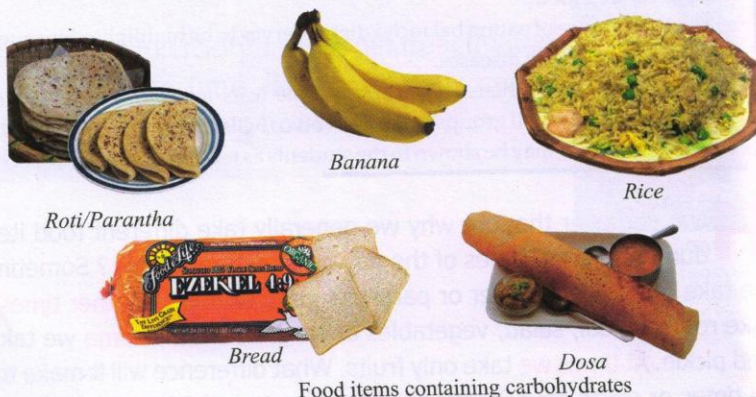
Carbohydrates

These are chemical substances (compounds) containing carbon, hydrogen and oxygen and are the main sources of energy for our body. A majority of us take chapatti/parantha, bread, rice etc. in our daily meal. Have you ever wondered why? Because, these foods are rich sources of carbohydrates and provide energy to the body for carrying out our daily activities. Some of the other common foods which contain carbohydrates are bajra, potato, banana, sugar, rice, fruit, juice, glucose etc. Plants are the main source of carbohydrates. Inside our body, carbohydrates combine with oxygen during respiration, get oxidised and produce energy.



INSIGHT

Glucose, Fructose, Sucrose, Lactose are different forms of sugar (carbohydrates). Table sugar contains sucrose, fruits contain fructose, honey contains fructose and sucrose and milk contains lactose.



Food items containing carbohydrates

Let us Revise

1. Which of the two will give us more energy - two bananas or two oranges?
2. Why is glucose solution taken by a sports person during or after the games?
3. Why is fruit juice generally given to a patient who is feeling weak?

There are different kinds of carbohydrates. Common carbohydrates present in our foods are in the form of sugar and starch. Sugars such as glucose and fructose are simple in structure whereas starch has comparatively complex structure and contains more energy. Glucose and fruit juices contain sugars whereas potato and rice are rich in starch. Let us do a simple activity to test the presence of sugar or starch (carbohydrates) in any food item:

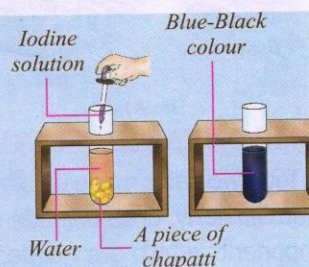


INSIGHT

Nutritious food and good eating habits result in sound health and proper mental development. Always wash your hands to avoid contamination of food. Add a variety of items to your food to get proper nutrition.

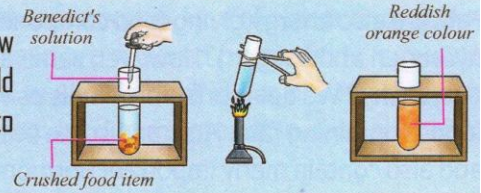
ACTIVITY - 1

Test for Starch: Take a small piece of chapatti or a slice of bread or potato (cut it). Crush it and add some water to make a solution. Add a few drops of iodine solution to it. What do you observe? The change of colour of solution from brown to blue black indicates presence of starch.



ACTIVITY - 2

Test for Sugar: Crush the given food item from the previous activity. Chew it sometime, put it in a test tube and make its solution by adding water. Add **Benedict's solution** to it. Heat it. Observe the colour. Change of colour to reddish orange indicates the presence of sugar in the food item.



Proteins

These are the chemical substances containing nitrogen, carbon, oxygen and hydrogen and are essential for growth, repair and maintenance of our body. Some common foods rich in protein include pulses, beans, nuts, milk, cheese, eggs, fish etc. We get proteins from plants as well as animals. However, animal proteins are known to be better than plant proteins.



Your Wisdom

Deficiency of proteins causes a disease called **Kwashiorkor**. Which food would you suggest to remove this deficiency?

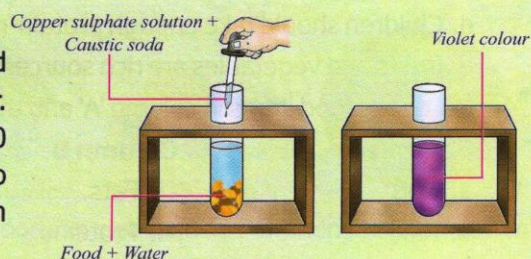
Fats

Fats are also energy giving food components and make the body strong. (These are compounds of carbon, hydrogen and oxygen). However, same amount of fat provides more energy than carbohydrates. Can you guess why? We get fats from animals as well as plants. Ghee, oil, butter, milk, meat etc. are some common foods containing fats. Nuts and some seeds also contain fats. These protect internal organs against shock and also contain many important **hormones** to regulate our body activities.

Proteins are known to form **haemoglobin** which carries oxygen from one part of the body to another. They also help in creating **antibodies** in the body which fight infection and protect the body from disease.

Teacher Demonstration

Test for Protein: Take some food item and crush it or grind it. Put small quantity in a test tube and add 5 ml of water. Now add few drops of copper sulphate solution and 10 drops of caustic soda solution to it. Shake it well. What do you observe? After sometimes violet colour appears which indicates the presence of protein.



Term Search

Benedict's solution : A chemical used to test the presence of sugar in food.

Haemoglobin : A component of blood.

Antibodies : Proteins found in blood used by the body to neutralize the effects of bacteria and viruses.

Vitamins

In addition to carbohydrates, proteins and fats, our body also requires another kind of compounds called vitamins for its proper functioning and good health. However, these are required by the body in minute quantities. In addition to keeping our eyes, teeth, skin, bones etc. healthy, vitamins also protect our body against many diseases. Absence or deficiency of vitamins in our regular diet may result in diseases called **deficiency diseases**.

Different kinds of vitamins are known by different names such as vitamin A, C, D, E or K etc. In addition, there is a group of vitamins B₁, B₂, B₆ and B₁₂ known as vitamin B-complex. Different vitamins have different vital functions in the body. This is shown in the table given below:

| Kind of Vitamin | Function |
|-------------------------------|---|
| Vitamin A | Keeps skin and eyes healthy. |
| Vitamin B (Group of Vitamins) | Helps in proper functioning of nerves and muscles. |
| Vitamin C | Keeps blood vessels, teeth and gums healthy, heals cuts and injuries. |
| Vitamin D | Makes bones and teeth strong. |

Different food items and in particular fruits and vegetables provide us with required vitamins. The following table gives us this information:

| Kind of Vitamin | Food Item |
|-----------------|---|
| Vitamin A | Papaya, Milk, Mango, Carrot |
| Vitamin B | Green vegetables, Eggs, Milk, Whole cereals |
| Vitamin C | Orange, Guava, Tomato, Amla, Lemon |

Do you take sufficient fruits, green vegetables and other foods to get required vitamins for maintaining good health? Discuss it with your friends and parents.

Minerals

Besides vitamins and other nutrients mentioned in the preceding sections, our body also requires some elements like iron, calcium, potassium, sodium, magnesium, chlorine, iodine etc. for proper growth and functioning. These are called **minerals** and are contained in different foods in the form of their salts.

These are also needed by the body in very small quantities, but are extremely essential.

Roughage

Indigestible fibrous material of food is known as **roughage**. It is an important part of our food. It helps in the proper functioning of digestive system. However, roughage does not provide any nutrient to our body. All plant products contain **cellulose** which is a kind of roughage. It is not digested by our body but helps in smooth movement of waste, keeps digestive system normal and prevents constipation. Food items like apple, orange, pear, cabbage, whole grain flour, whole pulses etc. contain high amount of roughage. Roughage retains water in the body by absorbing it in large quantity.

Water

Water is essential for human survival. It helps our body to absorb nutrients from food. Water helps to keep our body cool and healthy, keeps our skin smooth and glowing and helps in removal of waste in form of sweat and urine. We also get water through milk, tea, juices, fruits and vegetables. Excessive loss of water leads to **dehydration** which is dangerous for life.

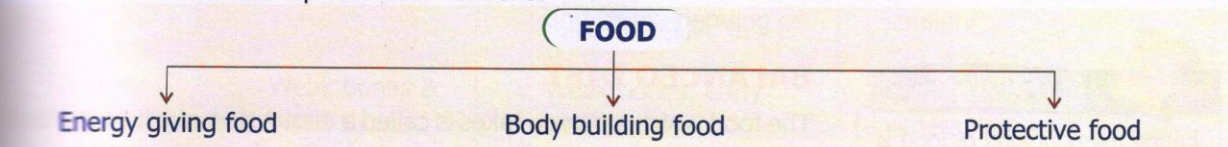
Let us perform an activity to show presence of water in food items.

ACTIVITY - 5

Test for Water: Take some food materials like potato, onion or apple. Weigh them on a balance initially. Keep them in hot sun for 3-4 days and then again weigh them. Compare the weights of the food item on first and fifth day. What do you observe? The decrease in weight is due to loss of water. Hence the above said food items contain water.

CLASSIFICATION OF FOOD ON THE BASIS OF ITS FUNCTION

It can be easily observed from the preceding sections that food can be divided mainly into three groups on the basis of functions it performs. These are:



Energy Giving Food

The foods which give us energy are called **energy giving foods**. These foods include carbohydrates and fats rich food, e.g., rice, bread, wheat, ghee, butter, milk etc.



INSIGHT

The energy given by foods is measured in terms of 'calories'.



Rice



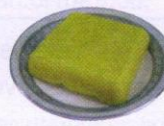
Bread



Ghee



Milk



Butter



Wheat

Energy giving foods

Term Search

Cellulose : A substance which forms fibres in plants.

Dehydration : A state of body when its water content reduces.

Body Building Food

The foods which help in body building by making new cells, and repairing tissues are called **body building** foods. Examples are milk, pulses, cheese etc.



INSIGHT

Eating the right kind of food is not enough. It should be cooked properly so that its nutrients are not lost. Moreover, if excess water is used for cooking, washing cereals, rice or vegetables it results in the loss of proteins and minerals.

BALANCED DIET

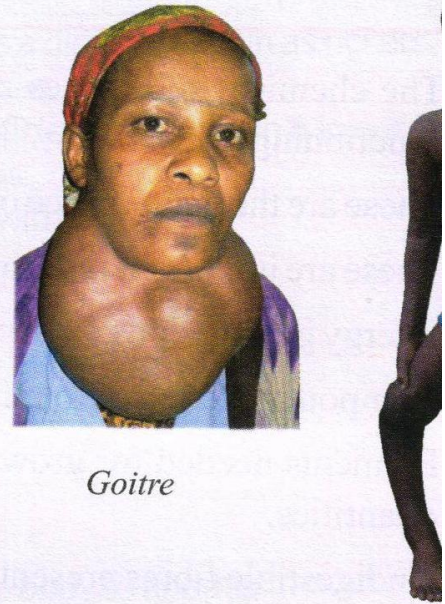
The food which a person takes is called a **diet**. A diet which contains all nutrients in proper amount / proportion as is required by our body for normal growth and functioning is called **balanced diet**. It includes energy giving food, body building food, minerals, vitamins, roughage and water. All essential nutrients and roughage are needed for proper functioning of the body and good health.

Let us Revise

1. Do you think that balanced diet is expensive? Prepare a list of food items which provide different nutrients but are quite inexpensive. Which of these items do you take regularly in your diet?
2. Is the balanced diet for an eleven-year old child, a forty-year old woman or a sixty-five year old man same? If no, what difference in their diet will make it suitable to their age group?
3. Why is it suggested not to wash the vegetables and fruits after cutting or peeling them?
4. Why is it considered sensible to include some raw fruits and vegetables in our diet?
5. Fat rich foods provide energy to the body. Then why is it advised not to eat too much of fried food?

DEFICIENCY DISEASES/DISORDERS

Lack of any of the nutrients, can cause abnormalities and diseases. These are called **deficiency diseases**. Lack of proteins in food for a long time may lead to **stunted growth**, swelling of face, discolouration of hair, skin diseases and diarrhoea. If food has deficiency of proteins and carbohydrates both, (called **PEM**, Protein Energy Malnutrition) it causes a disease called **marasmus** in which the growth stops completely. Some diseases/disorders are caused due to lack of vitamins and minerals in food. These are given in the table below:



Goitre

| Vitamin/ Mineral | Diseases/ Disorders | Symptoms |
|------------------------|---------------------|---|
| Vitamin A | Loss of vision | Poor vision, night blindness |
| Vitamin B ₁ | Beri- Beri | Weak muscles and very little energy to work |
| Vitamin C | Scurvy | Bleeding gums |
| Vitamin D | Rickets | Bones become soft and weak, bending of bones |
| Calcium | Weak bones & teeth | Weak bones, early tooth decay |
| Iodine | Goitre | Swelling in neck, enlargement of thyroid, mental disability |
| Iron | Anaemia | Weakness |

Quick Review

- Every organism needs food which provides essential nutrients.
- The major essential nutrients are carbohydrates, fats, proteins, vitamins, and minerals.
- Water and roughage do not provide any nutrients but are essential part of the food.
- Carbohydrates and fats are energy giving foods.
- Body building foods are rich in proteins.
- Vitamins help in protecting our body against diseases.
- Indigestible fibrous material of food known as roughage ensures smooth movement of food through digestive system.
- No single food can supply all the nutrients required by our body.
- Balanced diet consists of foods which contain all the nutrients required by our body in proper amount.
- A disease caused by the lack of a nutrient is called deficiency disease.

KEY WORDS

| | |
|---------------------|---|
| Nutrients | The chemical substances required by our body for its proper growth and functioning. |
| Carbohydrates | These are the main source of energy for our body. |
| Proteins | These are important for growth, repair, and maintenance of our body. |
| Fats | Energy giving foods. |
| Vitamins | Compounds required for proper functioning and good health of body. |
| Minerals | Elements needed for growth of our body. They are required in very small quantities. |
| Roughage | Undigestible fibres present in food stuffs. |
| Starch | A type of carbohydrates present in food. |
| Deficiency diseases | The diseases caused by lack of nutrients in our diet. |
| Balanced diet | A diet which contains proper amounts of all the nutrients required by our body. |

EXERCISES

A. Multiple Choice Questions:

- Vitamins are essential for the body to
 - Supply energy
 - Make new cells
 - Protect it from diseases
 - Grow fast
- Which one of the following constitute balanced diet ?
 - Roti, Rice, Dal, Vegetables, Pickle
 - Parantha, Butter, Curd, Egg, Fruits
 - Rice, Sambar, Idli, Pickle, Fruits
 - Roti, Dal, Salad, Vegetables
- A person needs maximum amount of calories in the age group of _____ .
 - 8 to 12 years
 - 25 to 30 years
 - 45 to 50 years
 - 65 to 70 years
- The essential food component that can be obtained only from plants is
 - Vitamins
 - Carbohydrates
 - Proteins
 - Roughage
- Butter and ghee are major sources of
 - Fats
 - Proteins
 - Roughage
 - Minerals
- Goitre occurs due to the deficiency of _____ .
 - Iron
 - Iodine
 - Potassium
 - Chlorine
- Our hair and nails contain
 - Calcium
 - Phosphorus
 - Fluorine
 - Proteins
- Which one of the following is a correct statement ?
 - Persons of different age groups require similar diet.
 - Persons in different jobs and having different life styles require different diet.
 - More fats and proteins are required during old age.
 - Balanced diet does not provide all essential nutrients in right proportion.

3. Fill in the blanks:

1. Fats contain _____ oxygen as compared to _____.
2. Anaemia is caused by deficiency of _____.
3. Deficiency of _____ causes a disease known as rickets.
4. Deficiency of Vitamin A causes a disease known as _____.
5. _____ is caused due to deficiency of vitamin B in our food.
6. Our food contains several components known as _____.
7. _____ and fats provide us with energy.

4. Alternative Response Type:

State True or False:

1. Apple contains iron.
2. Iodine causes goitre.

State Yes or No:

1. Is butter an energy giving food?
2. Do antibodies carry oxygen from one part of the body to another?

State Right or Wrong:

1. Loss of water leads to dehydration.
2. Vitamin A makes bones and teeth strong.

5. Analogy Type:

1. Starch test : Iodine solution :: Sugar test : _____
2. Pulse : Protein :: Butter : _____
3. Beri-beri : Vitamin B :: Scurvy : _____

6. Very Short Answer Type Questions:

1. Why is a variety of food required for proper growth of our body?
2. Which nutrient present in the food is a body building substance?
3. Name two foods which are rich in:
a. Proteins **b.** Starch **c.** Dietary fibre **d.** Fats
4. What is dehydration and how can it be overcome?
5. Mention two sources of fibre in our diet.
6. What is meant by malnutrition?
7. Why should we include vitamins in our food?
8. Which nutrients can be obtained from pulses and eggs?
9. What are deficiency diseases?
10. Name any two deficiency diseases.

7. Short Answer Type Questions:

1. Why is food important for our body?
2. Name five major nutrients in our food.
3. Describe the tests to detect presence of carbohydrates in our food.
4. Why are proteins important to us?
5. What is the importance of minerals in our food? Mention a few diseases caused by the deficiency of minerals in diet of a person.
6. Why is it essential to include roughage in our diet?

8. Long Answer Type Questions:

1. Explain the meaning of the term 'balanced diet'. Why is it essential to have a balanced diet? Do animals also require balanced diet?
2. How are deficiency diseases caused in human beings? Briefly explain the effects of eating food, which is deficient in carbohydrates and fats.
3. Write about Vitamin A and Vitamin D in reference to their:
a. Sources in food **b.** Functions in body **c.** Deficiency diseases **d.** Symptoms of deficiency

H. Matching Type (Double Matching):

| Column I | Column II | Column III |
|----------------|-----------------------|------------------------------|
| 1. Beri - Beri | a. Swelling in neck | A. Protein and carbohydrates |
| 2. Anaemia | b. Bending of bones | B. Iodine |
| 3. Marasmus | c. Stopping of growth | C. Iron |
| 4. Goitre | d. Weak muscles | D. Vitamin B |
| 5. Scurvy | e. Weakness | E. Vitamin D |
| 6. Rickets | f. Bleeding gums | F. Vitamin C |

ACTIVITY CORNER

Group Discussion:

Excess eating is bad for health. Try to find the ill effects of excessive intake of proteins and minerals. Collect information from library, doctors, dieticians, internet, parents, teachers and your friends. Discuss your findings with your friends and classmates.

Think and Tell:

Guess what is written on this board by writing the correct letter in the boxes given for each number. Find the appropriate letters by writing answers to the clues.

1 U 2 3 4 5 N T 6

1. Our hair and nails are made up of these

¹

2. These make our body strong.

²

3. This is important for proper functioning of digestive system.

³

4. These are needed in very small quantities

⁴

5. This liquid helps to keep our body cool.

⁵

6. Glucose and fructose are called

⁶

Do it Yourself:

Prepare a list of all food items taken by you during one week. Categorise these items as energy giving food, body building food, protective food, vitamin/mineral/ roughage rich food. Request your two friends also to prepare similar list. Discuss among yourselves whether you are taking balanced diet. Share the information with your parents.

Play and Learn:

Prepare a diet chart for yourself with the help of your teacher and parents. It should include seasonal fruits and vegetables commonly available in your area.

DISCOVERY

It is interesting to know that in Latin language, the word Vita means life i.e., vitamins are essential for living.

It was demonstrated by a famous British scientist, Sir Frederick Gowland Hopkins, that vitamins were very essential for survival of animals. Since their exact nature and composition was not known at that time, English alphabets A, B, C, ... were used for their distinction. However, we now fully understand their exact nature and composition.



*Sir Frederick Gowland Hopkins
(1861-1947)*