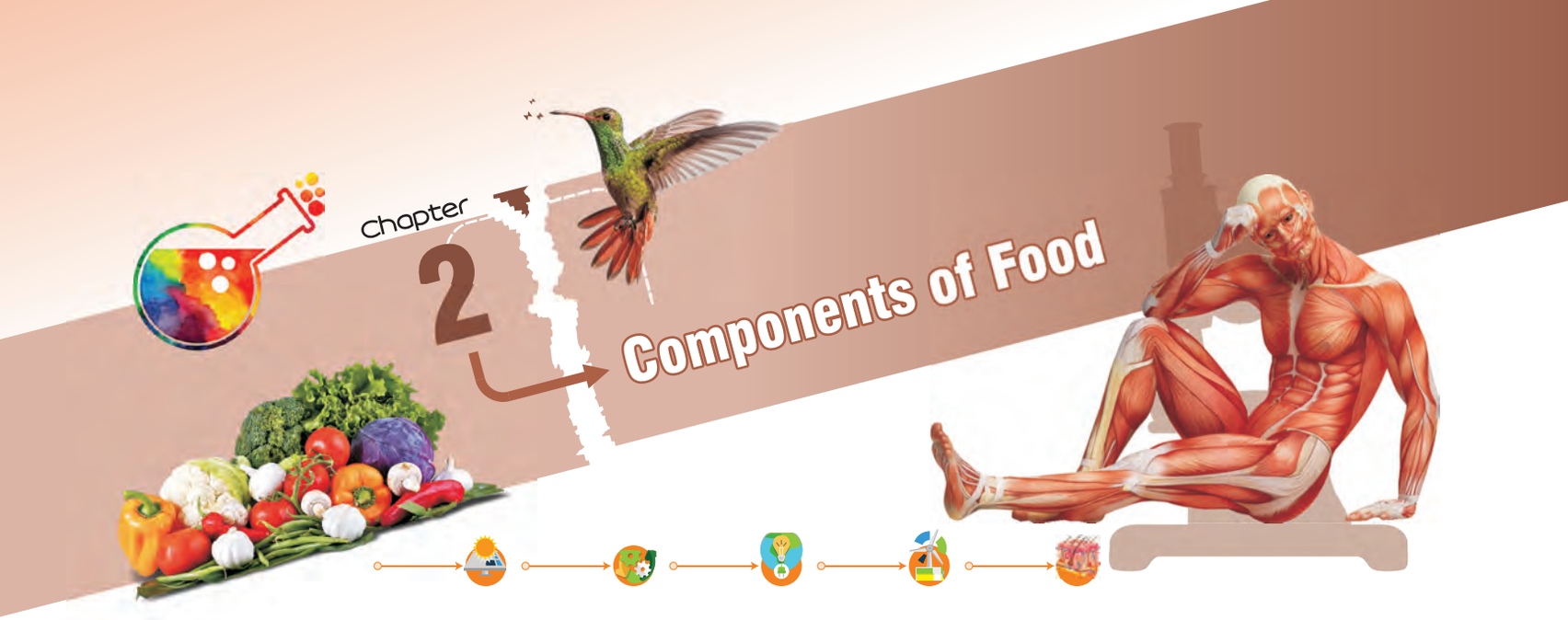


chapter 2

Components of Food

In the previous chapter, we learned about the various sources and varieties of food.

In this chapter, we will learn about :

1. The necessity of food for us.
2. What does food contain?
3. Balanced diet and why do we need it?
4. What happens when we do not eat a balanced diet?

INTRODUCTION

In north region of India such as Delhi, Haryana, Himachal Pradesh, Uttar Pradesh, Punjab and Uttarakhand, a meal generally consists of chapati, rice, green vegetables and dal. Similarly in South India (Chennai), a meal may consist of dosa, idli with Sambhar and vegetables.

Now imagine that you eat just dal, chapati or rice. How long would you be able to eat this type of food? Have you ever noticed why we need to eat different types of food together in a meal? The main reason behind it is that each type of these foods fulfills some specific requirements of our body. Let us study about the different components of our food and their role in making our body fit and healthy.

WHY DO WE NEED FOOD?

Eating good food, especially with family and friends, is one of the pleasures of life. We all know that people who eat healthy, balanced diets are likely to have:

- Plenty of energy to work and enjoy themselves;
- Fewer infections and other illnesses.

Children who eat well usually grow well. Women who eat well are likely to produce healthy babies. That is why it is important to know which combinations of foods make good meals and what are the different food needs of different members of the family.

A food is something that provides nutrients. Nutrients are substances that provide:

- Energy for activity, growth and all functions of the body such as breathing, digesting food and keeping body warm;
- Materials for the growth and repair of the body and for keeping the immune system healthy.

There are many different nutrients.We divide them into:

Macro (big) nutrients that we need in large amounts. These are:

- **Carbohydrates** (starches, sugars and dietary fibre);
- **Fats :** there are several kinds of fats;
- **Proteins :** there are hundreds of different proteins.

Micro (small) nutrients that we need in small amounts. There are many of these but the ones most likely to be lacking in the diet are:

- **Minerals :** iron , iodine and zinc;
- **Vitamins :** vitamin A, B-group vitamins (including folate) and vitamin C.

WHAT IS THERE IN OUR FOOD?

Carbohydrates

Carbohydrates are the compounds which are made up of three elements: carbon, hydrogen and oxygen, proportion of hydrogen and oxygen being the same as in water (the term carbohydrates actually means hydrates of carbon).

Glucose, sucrose and starch are the example of carbohydrates. Carbohydrates are the main source of energy in our body. Though carbohydrates are not the richest source of energy, they are the cheapest source of energy. The carbohydrates produce energy when they are oxidized in the body. 1 gram of carbohydrates produce about 17 kilojoules of energy and about 60 percent to 80 percent of the total energy contained in our diet comes from carbohydrates present in it. For a normal person, about 400-500 gram of carbohydrate is required daily. A growing child, a nursing mother or a sportsman, however, need more carbohydrate than cellulose. Cellulose which forms the cell wall of plants, is also a carbohydrate, but is not a food. This is because cellulose can not be digested or absorbed in the body. When eaten, however, cellulose acts as a roughage and helps in keeping the intestinal tract in good working order, that is cellulose helps in maintaining healthy digestive system. For example sugar is a type of carbohydrate which is sweet in taste. There are two kinds of sugar–simple sugar and compound sugar.

Sources of Carbohydrates : The carbohydrates in our food are obtained mainly from the plant sources like wheat, rice, maize, potato, sago (sabu-dana), peas, beans and fruits. Milk also contains a sugar called lactose. The sugar is also obtained from food. The world's three main cereal crops (or starchy food) which


Sugar


Sweet Potato


Grapes


Bread


Adzuki beans


Brown rice

Carbohydrate-rich food

provide us carbohydrates are: wheat, rice and maize. In other words, wheat, rice and maize are abundant in starch. Out of these, food from wheat is prepared in the form of roti, bread. Rice is used as such or in various other forms of food products such as noodles, dosa, idli, etc.

Interesting Fact

Pizzas, chocolates, jams, jellies, candies and burgers are the rich sources of carbohydrates.

Activity 1

Aim : To test the presence of carbohydrate (starch) in a food sample (potato).

Procedure : Cut the potato into two pieces.

Put 2 to 3 drops of dilute iodine solution on the cut surface of the potato piece with the help of a dropper.

Observation : A blue-black colour appears on the cut surface of the potato.

Conclusion : The appearance of blue-black colour shows that potatoes contain starch (which is a carbohydrate).

Starch test by iodine solution on potato

PROTEINS

Interesting Fact

Proteins are essential parts of all organisms and participate in virtually every process within cells.

Proteins are highly complex organic compounds made up of carbon, hydrogen, oxygen and nitrogen. Some of the proteins also contain elements such as sulphur and phosphorus. Proteins are very important in our food for growth and repair of the body. In other words, proteins are the materials required to build and repair our body. Proteins are essential for the growth of the child and teenagers, and




Protein-rich foods (pulses, soybeans, eggs, meat)

proteins are needed for maintenance of the wear and tear of body tissues in adults. In addition to all this, proteins also supply some energy to the body. Proteins are made up of nitrogen containing compounds called Amino Acids. Amino acids link through peptide bonds to form protein molecules. There are more than 20 of these amino acids and they all occur in almost all proteins. But the relative amount of each amino acid present differs in different proteins. Most of the proteins which are required to perform different functions in our body are prepared within the body from the unbounded amino acids.

It should be noted that the proteins consumed in our food are not used by our body in their original form. This is because of two reasons. Firstly because proteins are insoluble in water and secondly because they are very complex molecules. We shall now describe what happens when a protein-containing food is consumed by us. When the food is digested in small intestine, the proteins present in the food are broken down into simpler substances called amino acids. The amino acids are water soluble and less complex molecules. The amino acids thus formed are absorbed from the intestine into the blood. The blood carries these free amino acids to the various body cells where they are regrouped to form specific tissues and organs such as skin, muscle, blood and bones.

Some Important Proteins and their Functions

The properties or functions of food proteins depend on the amino acids of which they are made. Some proteins contain all the amino acids required by our body where as others contain only some of them. Some of important types of proteins required by our body are; enzymes, hormones, transport proteins, contractile proteins, structural proteins and protective proteins.

1. The function of enzyme proteins is to catalyze the biochemical reaction taking place in the body like digestion. Pepsin and trypsin are enzyme proteins.
2. The function of hormone proteins is to regulate the various body functions. Insulin is a protein hormone.
3. The function of transport proteins is to carry different substances from the blood to the various tissues of the body. Haemoglobin is an example of transport proteins.
4. The function of contractile proteins is to help in the contraction of muscles and other cells of our body. Myosin and Actin are contractile proteins.
5. The function of structural proteins is to form the structural elements of the cells and tissues of our body. Collagen is an example of structural proteins.
6. The function of protective proteins is to help fight infection in our body. Gamma globulin present in blood is an example of protective proteins.

Sources of Proteins

We can get proteins from plant sources as well as animal sources. Some of plant proteins are; groundnuts, beans, whole cereals like wheat, maize and pulses. Some of the best sources of animal proteins are; lean meat (meat without fats), fish, eggs, milk and cheese. These are all body building foods. The most valuable proteins are found in milk and eggs. They contain all the amino acids required by our body. These proteins are particularly needed by children.

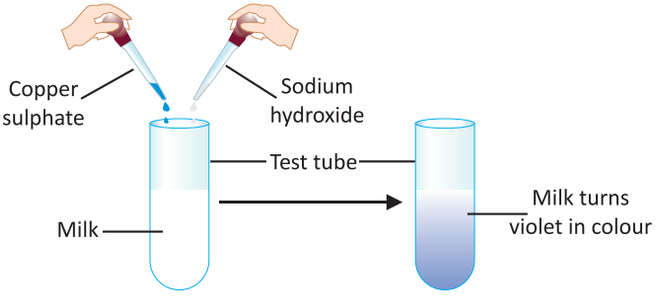
Activity 2

Aim : To test the presence of proteins in milk.

Procedure : Take some milk in a test tube. Add 2-4 drops of dilute sodium hydroxide solution and 2-3 drops of copper sulphate solution to it. Shake the test tube.

Observation : A violet colour appears in the solution.

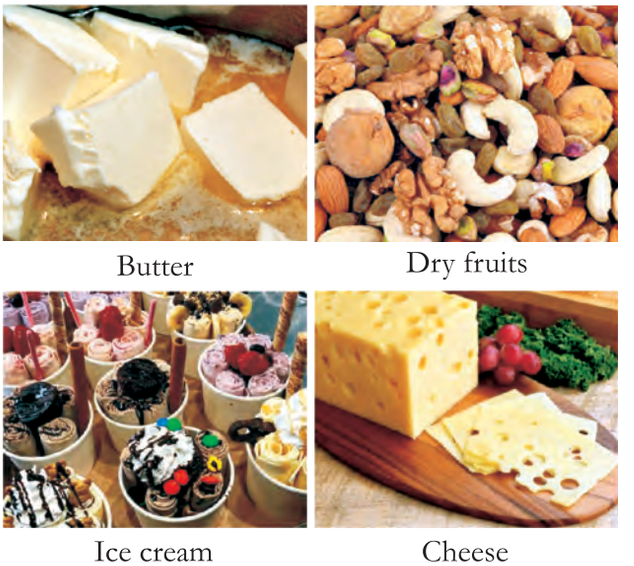
Conclusion : The milk contains proteins.



Protein test by sodium hydroxide solution and copper sulphate solution on milk

FATS

The fats are actually made of the same three elements carbon, hydrogen and oxygen of which the carbohydrates are made. The difference lies in the fact that fats contain less proportion of oxygen, as they consist of three molecules of a fatty acid and one molecule of glycerol. Fats are the members of a heterogeneous group of organic compounds known as Lipids. Like carbohydrates, the main function of fats in the body is to provide a steady source of energy, and for this purpose they are deposited in various fat depots within the body and under the skin. In fact, fats provide twice as much energy as that provided by the same amount of a carbohydrate. For example, 1 gram of a carbohydrate on oxidation in the body during respiration gives about 17 kilojoules of energy whereas 1 gram of a fat (or oil) gives about 37 kilojoules of energy, which is more than double of that given by carbohydrates. The fats provide more energy because fat molecules contain higher percentage of carbon and hydrogen but less percentage of oxygen than that of carbohydrates. Due to less percentage of oxygen present in it, a fat molecule requires more oxygen for its combustion and hence produces less heat energy. From this discussion we conclude that both, carbohydrates and fats, serve mainly as sources of energy to our body. Actually, fats are the richest source of energy to our body, but they are more expensive than carbohydrates. Fats can also be stored in the body for subsequent use. The fats present in our food cannot be absorbed by our body as such because they are complex organic molecules which are insoluble in water.



Fat-rich Foods

Sources of Fat

Fats are supplied to our body by many foods like butter, milk, egg, etc. All the cooking oils provide us fats. The fats which we eat in our food are dietary fats.

Interesting Fact

Egg yolk is rich in fats. Fats are of two types : healthy fats and unhealthy fats.

All the above given food items contain dietary fats. We shall now discuss the major fatty acids present in some common dietary products.

In Butter : The major fatty acid present in butter is butyric acid. Butyric acid is a fatty acid because it contains a single bond.

In Coconut Oil : The major fatty acid present in coconut oil is octanoic acid. This is also a saturated fatty acid.

In Animal Fats : The major fatty acid present in animal fat is stearic acid.

In Plant Fats : The major fatty acid present in plant fats is oleic acid.

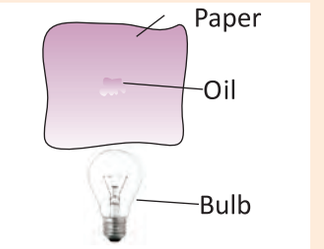
It will be good to note here that the fatty acid containing only single bond in their molecules are called saturated fatty acid.

Activity 3

Aim : To test the presence of fat in a food item.

Procedure : Take a food sample, wrap it in a paper and press it. Take care that the paper does not tear. Now hold the paper against light.

Observation and conclusion : If you see an oily patch on the paper, it shows that the food item contains fat.



VITAMINS

Vitamins are the complex organic compounds found in some foods which are necessary for the well-being of the entire body. Vitamins are necessary for normal growth, good health, good vision, proper digestion, healthy teeth, gums, and bones, and for life to be maintained. Vitamins act as catalysts in certain chemical reaction of metabolism in our body, which laid to normal growth and good health. Vitamins do not provide energy to our body, so in this respect they differ from carbohydrates and fats which provide energy. Though vitamins are needed by our body in minute quantities but their presence is essential in our diet.

Sources of Vitamins

When vitamins were discovered, their chemical composition was not known immediately. So, initially, the vitamins were represented by letters like A, B, C, D, etc. More than 15 vitamins are known at present and each one of these is needed for a specific purpose in the body. Some of the important vitamins are; vitamin A, vitamin B complex, vitamin C, vitamin D, Vitamin E and Vitamin K. Most of the vitamins cannot be made by our body, so they have to be supplied through various foods which contain them. Only two vitamins called vitamin D and vitamin K can be made in our body. All the vitamins are prepared in plants. Almost all the food items contain more than

one vitamin in varying amounts. These days, however, all the vitamins are also being produced synthetically. It should be noted that unlike carbohydrates, fats and proteins, the amount of minerals and vitamins needed in our diet is not large, but we must have them in the diet since the body does not make these substances.

Fat-soluble Vitamins

Fat-soluble vitamins (vitamin A, D, E and K) are mainly found in:

- animal fats
- vegetable oils
- dairy foods
- liver
- oily fish

Interesting Fact

Vitamins are called protective foods as they protect our body from various diseases.

While your body needs these vitamins to work properly, you don't need to eat foods containing them every day.

Water-soluble Vitamins

Water-soluble vitamins (vitamin C, vitamin B and folic acid) are mainly found in:

- fruits and vegetables
- grains
- milk and dairy products

These vitamins aren't stored in the body, so you need to have them more frequently.

If you have more than you need, your body gets rid of the extra vitamins when you urinate.

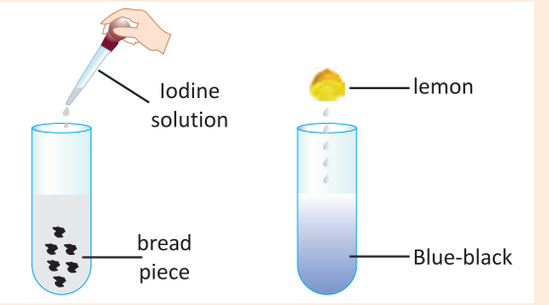
Vitamin	Function	Sources
Vitamin A	Forms and maintains teeth, bones, tissue, and skin	Found in ripe yellow fruits, carrots, oranges, paprika, squash, red peppers, leafy green vegetables, cayenne, pumpkin, chili powder, spinach, soya milk and sweet potatoes
Vitamin B1	Part of an enzyme needed for energy metabolism; important for nerve functions	Found in all nutritious foods in moderate amounts: pork, whole-grain or enriched breads and cereals, legumes, nuts and seeds
Vitamin B2	Part of an enzyme needed for energy metabolism; important for normal vision and skin health	Milk and milk products; leafy green vegetables; whole-grain, enriched breads and cereals

Vitamin	Function	Sources
Vitamin B12	Part of an enzyme needed for making new cells; important for nerve functions	Meat, poultry, fish, seafood, eggs, milk and milk products; not found in plant foods
Vitamin C	Antioxidant; part of an enzyme needed for protein metabolism; important for immune system and health; aids in iron absorption	Found only in fruits and vegetables, especially citrus fruits, vegetables in the cabbage family, cantaloupe, strawberries, peppers, tomatoes, potatoes, lettuce, papayas, mangoes, kiwifruit
Vitamin D	Needed for proper absorption of calcium; stored in bones	Egg yolks, liver, fatty fish, fortified milk, fortified margarine. When exposed to sunlight, the skin can make vitamin D
Vitamin E	Antioxidant; protects cell walls	Polyunsaturated plant oils (soyabean, corn, cottonseed); leafy green vegetables; wheat grain; whole-grain products; liver; egg yolks; nuts and seeds
Vitamin K	Needed for proper blood clotting	Leafy green vegetables such as kale, collard greens and spinach; green vegetables such as broccoli, Brussels sprouts and asparagus; also produced in intestinal tract by bacteria

Activity 4

Aim : To test the presence of vitamin C in a food item.

Procedure : Take some bread pieces in a test tube and add few drops of iodine solution. You will see that the colour changes to blue black. Now use this solution to test the presence of vitamin C. Add 2 drops of lemon juice to the solution. Shake it well and hold the test tube against a white background.



Observation and Conclusion : You will see that the colour of the solution has become lighter or even disappeared. This confirms the presence of vitamin C in lemon juice.

MINERALS

The metals, non metals and their salts are called minerals because they are mined from the soil, ground and the earth. Our body needs minerals for its proper functioning, normal growth and good health. Minerals are needed to build bones, teeth, formation of red blood corpuscles, and coagulation of blood, functioning of muscles, lever and thyroid gland, etc. Several minerals are

needed for enzymes to do their work. Some of the important elements needed by our body are: iron, iodine, calcium, phosphorus, sodium, potassium, zinc, copper, magnesium, chlorine, fluorine and sulphur. The deficiency of minerals in the body causes many diseases. Minerals, however, do not supply any energy to our body. They are essential for the metabolic activities of the tissues. Our body can use minerals in the compound form and not as pure elements. For example, we can not use sodium metal or chlorine gas in their element form as such; because they are toxic (poisonous) and can even kill a person. But their compound called sodium chloride is a mineral salt which is harmless and, in fact, essential for our body. We get most of the minerals from plant sources. This is because plants take the various minerals from the soil through their roots and supply them to man and animals through the food chain. So, even the minerals which we get form some animals are, in fact, derived from the plants which the animals eat.

IMPORTANT BODY MINERALS, THEIR FUNCTIONS AND SOURCES

Though our body requires a large number of minerals, but the more important ones are: iron, iodine, calcium, phosphorus and zinc.

Iron

Iron is the most important element required by our body. Iron is needed to prepare a protein called Haemoglobin present in blood. This haemoglobin helps us in transporting oxygen from the lungs to the body cells through the blood. Some of major sources of iron are: bajra ragi, eggs, etc.

Iodine

Iodine is another important element needed by our body. Iodine is needed in small quantities for the preparation of thyroid hormone called thyroxin. Some of the major sources of iodine are: fish, sea-food and iodized salt.

Calcium

Calcium salts are required for making bones and teeth, to help blood clotting and for the proper working of the muscles. The major sources of calcium are: milk, milk products like cheese, etc., beans, green leafy vegetables, whole gram, meat, fish, ragi, etc.

Phosphorus

Phosphorus is required for the formation of bones and teeth. Phosphorus is also required for the conservation of carbohydrates in energy. Phosphorus is important because it is a compound of A.T.P., D.N.A., R.N.A. The major sources of phosphorus are: milk, vegetables, bajra, ragi, nuts, etc.

Zinc

Zinc helps our body:

- to make new cells and enzymes
- to process carbohydrates, fats and proteins in food
- in the healing of wounds.

Good food sources of zinc include:

- meat
- shellfish
- dairy foods
- cereal products such as wheat, gram and wholegrain bread.

Roughage

Though roughage is not a food, it is an important part of balanced diet. Roughage neither gives us energy like carbohydrates and fats nor builds our body like proteins do, but it is important for the normal working of the digestive system. Roughage is the fibrous material present in plants and their products like fruits and vegetables. Roughage mainly consists of the indigestible plant carbohydrates called cellulose. The walls of the plant cells are made up of cellulose. So, when we eat fruits, vegetables and plant material, then a large quantity of cellulose goes in our body. But our body does not have enzymes to digest it. The cellulose remains undigested and being a fibrous material acts as roughage and keeps the digestive system in order. The various functions of roughage in our body are given below :


Roughage

1. Roughage helps in retaining water in the body. This is because of the fibrous nature of the roughage. Being fibrous, cellulose can absorb a lot of water and help retain water in the body.
2. Roughage adds bulk to food and prevents constipation. Since roughage is bulky, it expands the intestines as it moves through them and makes the passage of food easer. The roughage also stimulates the muscle contraction in the intestine walls causing movement of food. Thus, roughage keeps the food moving in the intestine and hence prevents constipation.

Sources of Roughage

The sources of roughage in our food are : salad, vegetables and fruits with high fiber contents. Cabbage is one vegetable which provides us a lot of roughage. Corn cob and half crushed wheat also provide roughage to our body, along with other nutrients. All these food items have cellulose content which act as roughage. These fibrous materials are good for digestion and help in bowel movement.

Water : Water is an inorganic substance made up of hydrogen and oxygen. Water is not considered a food because it does not give energy like carbohydrates and fats or builds body tissues like proteins. Water is however, an essential part of a man's diet because it helps in preparing food for assimilation by the body. Water is present in the cell protoplasm, blood plasma and in the intercellular fluid in the tissues. In fact, about two third of a man's body weight is the water in the tissues of his

Interesting Fact

Our body contains about 4,500 to 5,700 ml or 7 to 9% of ideal body weight and blood contains large quantity of water.

body. Water plays an important role in a large number of processes like digestion, transport and helps in regulation of body temperature.

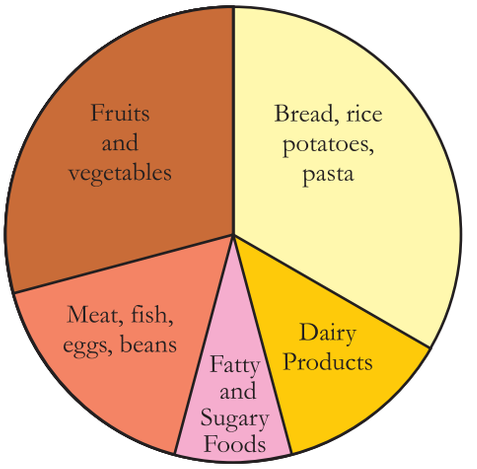
Water is the solvent for all the salts in the body and it is the medium in which all chemical reactions take place in the body. Water is a good solvent so it dissolves the food nutrients which can then be absorbed or digested by the body. Water acts as a solvent for transporting dissolved food materials from the digestive tract to the blood. Water also dissolves the waste material of our body and hence provide a good medium for excreting body wastes. An important role of water in our body is to regulate the body temperature, the process of sweating and evaporation. When the outside temperature is high, the water oozes out through the skin in the form of sweat. When this water evaporates from our body, it takes the latent heat of vaporization from skin. By losing heat, the skin cools down a little and we feel comfortable. The survival time without water is very short. Without water, the body cells can not function and they die.

Sources of Water in Our Body : The amount of water needed by body depends on one's age, type of work and the climate. Our body gets a lot of water from many of the food items which we eat. For example, fruits, vegetables, meat and fish give a lot of water to our body. Most of the water needed by our body, however, comes from the plain drinking water, tea, coffee, milk, etc. Some of the water in our body comes as a byproduct of the oxidation of glucose during the digestion of the food. Infact, 1 molecule of glucose on oxidation in the body produces 6 molecules of water.

BALANCED DIET

A diet is all that we consume in a day. And a balanced diet is a diet that contains an adequate quantity of the nutrients that we require in a day. A balanced diet includes six main nutrients, i.e. fats, protein, carbohydrates, fibre, vitamins and minerals.

All these nutrients are present in the foods that we eat. Different food items have different proportions of nutrients present in them. The requirement of the nutrients depend on the age, gender and health of a person.



Importance of a Balanced Diet

The following are the importance of a balanced diet :

- Balanced Diet leads to good physical and mental health.
- It helps in proper growth of the body.
- Also, it increases the capacity to do work.
- Balanced diet increases the ability to fight or resist diseases.

Components of a Balanced Diet

Some components of a balanced diet are as follows :

Fats : Some part of our energy requirement is fulfilled by fats. Fats can be found in fatty foods such as butter, ghee, oil, cheese, etc.

Proteins : We need proteins for growth purposes and to repair the wear and tear of the body tissues. Protein also helps in building muscle. It is found in dairy products, sprouts, meat, eggs, chicken, etc.

Carbohydrates : We need the energy to work and it is fulfilled by carbohydrates. Carbohydrates provide us energy. Carbohydrates can be found in rice, wheat, chapati, bread, etc. Cereals are our staple food.

Minerals and Vitamins : Vitamins, minerals and fibres improve the body's resistance to disease. We mainly obtain them from vegetables and fruits. Deficiency diseases like Anaemia, Goitre, etc., can be caused due to the lack of minerals in the body.

WHAT HAPPENS IF WE EAT TOO MUCH ?

- Overeating causes the stomach to expand beyond its normal size to adjust to the large amount of food. The expanded stomach pushes against other organs, making you uncomfortable. This discomfort can take the form of feeling tired, sluggish or drowsy. Your clothes also may feel tight, too.
- Eating too much food requires your organs to work harder. They secrete extra hormones and enzymes to break the food down.
- To break down food, the stomach produces hydrochloric acid. If you overeat, this acid may back up into the esophagus resulting in heartburn. Consuming too much food that is high in fat, like pizza and cheeseburgers, may make you more susceptible to heartburn.
- Your stomach may also produce gas, leaving you with an uncomfortable feeling.
- Your metabolism may speed up as it tries to burn off those extra calories. You may experience a temporary feeling of being hot, sweaty or even dizzy.

- When you eat, your body uses some of the calories you consume for energy. The rest are stored as fat. Consuming more calories than you burn may cause you to become overweight or obese. This increases your risk for cancer and other chronic health problems.
- **Overeating :** especially unhealthy foods can take its toll on your digestive system. Digestive enzymes are only available in limited quantity, so the larger the amount of food you eat, the longer it takes to digest. If you overeat frequently, over time, this slowdown the digestive process, means the food you eat will remain in the stomach for a longer period of time and be more likely to turn into fat.

Discover

Visit http://www.who.int/medicentre/factsheets/fs311/en/index.html and find out how the WHO defines overweight and obesity.

- Overeating can even impact your sleep. Your circadian clock, which controls your sleep cycles, causes your sleep and hunger hormone levels to rise and fall throughout the day. Overeating can upset this rhythm, making it hard for you to sleep through the night.

Activity 5

Aim : To calculate Body Mass Index.

Procedure : Calculate your BMI by the formula :

$$\text{BMI} = \text{Your weight in kg} / (\text{your height in metres})^2$$

Also calculate the BMI of your classmates and analyse the health status of your class.

WHAT HAPPENS IF WE EAT TOO LESS ?

As we discussed in previous chapter, there are many people in the world who do not get enough food. By taking less food their bodies do not get enough nutrition. As a result their bodies do not get some nutrients in the required amounts.

A condition of disease caused by deficiency of a specific vitamin, mineral, or macronutrient such as protein, resulting from inadequate dietary intake is called deficiency disease.

Rickets : X-ray

Kwashiorkor

Goitre

Marasmus

Nutrient deficiency diseases occur when there is an absence of nutrients which are essential for growth and health. Lack of food leading to either malnutrition or starvation gives rise to these diseases.

Disease (and key nutrient involved)	Symptoms	Foods rich in key nutrients
Source : *Gordon M. Wardlaw, Perspectives in Nutrition (1999)*		
Xerophthalmia (Vitamin A)	blindness from chronic eye infections, poor growth, dryness and keratinization of epithelial tissues	liver, fortified milk, sweet potatoes, spinach, green vegetabls, carrots, cantaloupe, apricots
Rickets (VitaminD)	weakened bones, bowed legs, other bone deformities	fortified milk, fish oils, sun exposure
Beriberi (Thiamin)	nerve degeneration, altered muscle coordination, cardiovascular problems	pork, whole and enriched grains, dried beans, sunflower seeds
Pellagra (Niacin)	diarrhoea, skin inflammation, dementia	mushrooms, bran, tuna, chicken, beef, peanuts, whole and enriched grains

Disease (and key nutrient involved)	Symptoms	Foods rich in key nutrient
Scurvy (Vitamin C)	delayed wound healing, internal bleeding, abnormal formation of bones and teeth	citrus fruits, strawberries, broccoli
Iron-deficiency or Anaemia (Iron)	decreased work output, reduced growth, increased health risk in pregnancy	meat, spinach, seafood, broccoli, peas, bran, whole-grain and enriched breads
Goitre (Iodine)	enlarged thyroid gland, poor growth in infancy and childhood, possible mental retardation, cretinism	iodized salt, saltwater fish

Protein Deficiency Diseases

1. **Marasmus :** Young children and infants are vulnerable to consequences of lack of protein. Marasmus is a severe lack of important nutrients. This is a fatal disease that causes weight loss and dehydration.

2. **Kwashiorkor :** Lack of proteins from carbohydrates sources like rice, yams and bananas causes kwashiorkor. This is a severe malnutrition disease common in older children. The University of Maryland Medical Center explains that symptoms of the illness include a swollen stomach due to fluid retention. It also has symptoms common to Marasmus such as irritability, diarrhoea, fatigue, limited growth and cognitive development as well as mental health.

Key Words

Nutrient : chemical substances in food which provide energy and help in growth
Energy : the capacity to do work
Proteins : body-building nutrients
Minerals : nutrients required to build bones and teeth, ensure proper functioning of muslces, nerves and thyroid gland
Carbohydrates : group of food substances containing sugar and starch
Balanced diet : a diet that contains adequate amounts of all the nutrients sufficient for the normal growth and development of the body
Fats : nutrients that are the richest source of energy
Deficiency disease : a disease caused by the lack of nutrients in our diet over a long period of time

Vitamins : nutrients that help in protecting our body against various diseases
Roughage : indigestible fibrous substance found in fruits, vegetables and wholemeal products

Important Points

1. The components of our food are carbohydrates, fats, proteins, vitamins, minerals, water and roughage.
2. Proteins and minerals are needed for the growth and maintenance of our body.
3. Roughage is available from fibrous food and is essential for the normal working of the digestive system.
4. The deficiency of one or more nutrients in our food for a long time may cause deficiency diseases.
5. Vitamins help in protecting our bodies against diseases.
6. Carbohydrates and fats provide energy to our body.
7. A balanced diet provides us all the essential nutrients in the required quantity along with adequate amount of roughage and water.

Exercise

Multiple Choice Questions (MCQs)

A. Tick (✓) the correct option :

1. The main carbohydrate which we get in our food is :
   (a) protein ☐ (b) starch ☐ (c) vitamin ☐ (d) mineral ☐
2. Vitamin D is synthesised in our body in the presence of :
   (a) street light ☐ (b) torchlight ☐ (c) moonlight ☐ (d) sunlight ☐
3. Cooking of food at a very high temperature destroys a major portion of :
   (a) vitamin B ☐ (b) vitamin D ☐ (c) vitamin A ☐ (d) vitamin C ☐
4. We can prevent dehydration of the body by the intake of :
   (a) milk ☐ (b) water ☐ (c) lemonade ☐ (d) all of these ☐
5. Foods containing carbohydrates and fats are called :
   (a) body-building foods ☐ (b) energy-giving foods ☐
   (c) protective foods ☐ (d) fibrous foods ☐
6. Which of the following are body building nutrients?
   (a) vitamins ☐ (b) carbohydrates ☐ (c) fats ☐ (d) proteins ☐
7. Vitamins are known as :
   (a) body building foods ☐ (b) roughage foods ☐
   (c) energy giving foods ☐ (d) protective foods ☐
8. Roughage helps our body in :
   (a) the development of bones ☐ (b) the growth of muscles ☐
   (c) fighting diseases ☐ (d) movement of faeces in intestine ☐

B. Fill in the blanks :

1. Carbohydrates are _____ food.
2. _____ is a water-soluble vitamin.
3. Our food has _____ components.
4. Repeated washing of rice and pulses removes the _____ vitamins.
5. Roughage is a/an _____ carbohydrate.
6. _____ is necessary to make haemoglobin present in red blood cells.
7. _____ are a rich source of proteins.

C. Match the following :

Column A	Column B
1. Starch	(a) Carrots
2. Vitamin A	(b) Potato
3. Iron	(c) Milk
4. Sugar	(d) Eggs
5. Calcium	(e) Lemon
6. Fat	(f) Green Vegetables
7. Protein	(g) Honey
8. Vitamin C	(h) Nuts

D. Very Short Answer questions :

1. Name a nutrient that helps the body to grow.
2. Name the chemical which turns starch blue-black.
3. Name the mineral whose deficiency causes goitre.
4. What is the diet containing all the nutrients in proper amount called?
5. What is the condition of an overweight person is called?
6. Name a disease caused by deficiency of nutrients in the diet.

E. Short Answer Questions :

1. Why are fats very important in our diet?
2. What are deficiency diseases?
3. What are the main food groups?
4. Define balanced diet.
5. What is malnutration?
6. What is nutrition?
7. Why is vitamin C necessary for us? Name two food materials rich in vitamin C.
8. What is roughage? How is it useful to the body?
9. Why are minerals necessary in our diet?
10. What nutrients provide energy to our body?

F. Long Answer Questions :

1. Write the important functions of water in our body.
2. What happens if we eat too much?
3. Why are proteins essential? Mention some sources of proteins.
4. Write the causes and symptoms of following diseases :

   (a) Scurvy (b) Goitre (c) Beri-Beri (d) Anaemia
5. How can you test for the presence of fat in a given food sample?
6. What are different kinds of vitamins? Write their functions also.

Assignments

A. Read the passage and answer the following questions.

We eat different meals in a day and a meal could consist of bread omlette and milk in breakfast, rice, daal (pulses), vegetable, curd, and salad and chapati in lunch, potato chips or burger in snacks and fish curry in dinner. We eat food not just to stop rumbling sound that comes from our stomach when we are hungry but also to gain some energy to do work for whole day. For a healthy heart, working of muscles and active brain, we must eat a balanced diet that gives proper nutrients to our body. These nutrients will get you strong bones as well as energy. Each dish is made up of one or more ingredients which we get from animals and plants. These ingredients include important components that are needed by our body to function properly. And these components are called Nutrients. These nutrients in our food are named as fats, carbohydrates, proteins, vitamins and minerals. Also, food contains water and dietary fibres which are needed by human body.

1. What food items we take at breakfast and lunch?
2. Why we need food?
3. What is a balanced diet?
4. Is water an essential part of our food?

Project

Collect the wrappers of food items like butter, noodles, chips, biscuits, wafers, cornflakes, aerated drinks, flavoured milk, etc. Study the nutritional information given on the wrappers. Classify as food rich in carbohydrates, fats, proteins, vitamins, calcium and iron.