4 HUMAN HEALTH

In this chapter you will learn:

- Introduction to important components of our diet like proteins, carbohydrates, fats, vitamins, minerals and water.
- To determine food and energy needs with respect to age, sex, climate, and physiological condition of the body.
- Importance of balanced diet for people belonging to different age groups.
- Definition and explanation of nervous system with respect to endocrine glands.
- Brief introduction to various stages and related problems of human life.
- Importance of exercise in human life.
- Use of first aid.

The health is wealth and a great gift from God Almighty. Human health not only depends upon the type of the food we take in but also on the fact whether a man is acquainted of all the phenomenon occurring in its body. Only after having a comprehensive knowledge of all these facts he can be successful to maintain his health. In this chapter, we shall not only discuss the role of diet to maintain the human health but we shall also try to investigate both intrinsic and extrinsic factors that influence human health and how a man can cope with all these challenges.

4.1 Food and its Major Components

Food is the basic necessity of human life. Scientifically speaking food is any thing which after digestion provides energy to the body for various activities and also helps in its growth and development.

Water

Water is utmost important for life. A man can survive without food for at least a month but just for a few days without water. It is the most important component of human body, it makes almost 60% of an adult body weight. Water performs a number of very important functions in human body. It helps to maintain our body temperature. It acts as a medium for various chemical reaction in body. It helps in the metabolism of various substances in the presence of enzymes in the intracellular environment. It transports the nutrients to the cells and helps in the excretion of wastes of body. It acts as a lubricant in the joints and other internal body organs.

Carbohydrates

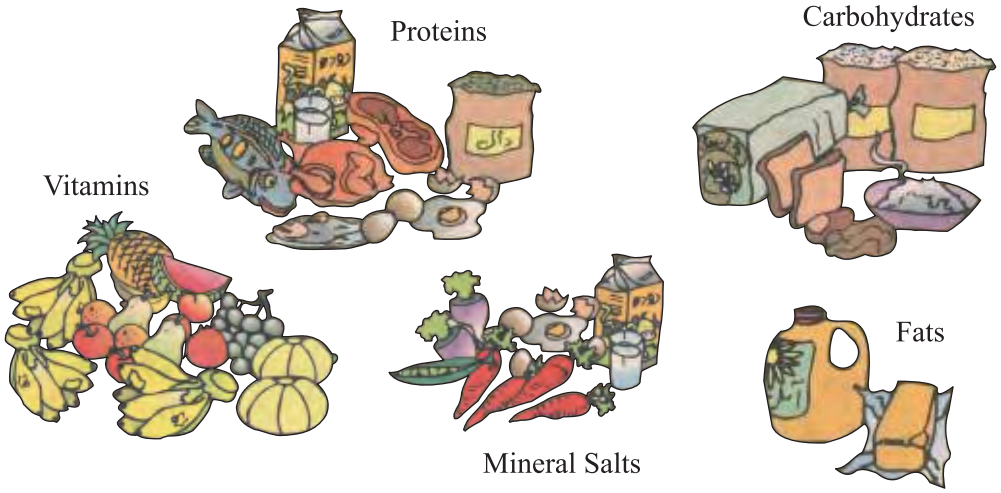
They occur abundantly in all the living organisms and in almost all the cells. Cellulose of wood, cotton and paper, starch present in muscles of animals, lactose of milk and sucrose of cane are all examples of carbohydrates.

They play an important structural and functional role in living organisms. They are the primary source of energy for the cell. Wheat, rice, pulses, sugarcane, potato and beat are major sources.

Fats

Lipids are classified as fats and oils. Fats are solid while oils are liquids at room temperature. Fats are obtained from animals while oils are produced from plants. The lipids are formed by the chemical combination of fatty acids with glycerol.

Butter, cream, corn oil, ghee are the examples of lipids. Fats provide a large amount of energy to our body as compared to carbohydrates and proteins. They provide the body with fat soluble vitamins. They accumulate below the skin and help to conserve the body heat. In addition they also protect the vital organs of our body such as heart, liver, kidney from mechanical injuries.



Proteins

After water, the proteins are the most abundant of all the chemical substances in the body. The muscles, tissues and blood all are made up of proteins. They perform such important functions in body which would otherwise be impossible to occur. These are the large complex molecules made up by the condensation of amino acids that are the building blocks of proteins molecules.

They can be obtained from both plants and animals. Milk, egg, meat, fish are the animal sources of proteins whereas wheat, beans, pulses etc are its botanical sources.

All the proteins are made up of twenty different types of amino acids.

Proteins act as enzymes to catalyze various chemical reactions of the body. They act as hormone and bring about coordination in various physiological activities of the body.

They defend the body against various diseases by producing antibodies and so induce an immune response. They also help in transporting various materials from one part of the body to the other e.g. hemoglobin.

Vitamins

These are the organic substances which are needed in the body in fractions only. They act as coenzymes in most of chemical reactions in the body. The body cannot grow normally if they are not taken in regularly. They can be divided into two groups.

1. Fat Soluble Vitamins (A,D,E,K)
2. Water Soluble Vitamins (B,C)

Fat Soluble Vitamins

Vitamin A: It is found in abundance in the green leafy vegetables. It is present in large concentration in carrot, spinach, pea, cabbage and tomatoes. In addition, it is also present in wheat, corn, cream, butter, cod liver oil and liver of other animals. It helps to control the cellular metabolism and body growth. Vitamin A deficiency results in night blindness. The patients suffering from this disease are unable to see at night. Its deficiency also retards the growth in children. It may also cause various skin and dental diseases.

Vitamin D: Sun is the cheapest source of this vitamin. Human skin has the ability to synthesize this vitamin in the presence of sunlight. In addition, It may also be obtained from fish liver oil, milk butter, cream and egg yolk. Presence of proper amount of this vitamin in our daily diet promotes bone formation and calcium absorption in our body. Its deficiency results in softening, weakening and deforming of bones. Its deficiency in childhood causes rickets while in adulthood its deficiency results in osteomalacia.

Vitamin E: This vitamin can be obtained from seeds, wheat and egg. It can also be obtained from green leafy vegetables. Deficiency of vitamin E in the blood leads to serious muscular and nervous disorders. Its deficiency may also lead to infertility.

Vitamin K: It can be obtained from spinach and other green leafy vegetables. It is also found in meat in small quantities. This vitamin is helpful in blood clotting.

Deficiency of vitamin K slows down the blood clotting mechanism.

Water Soluble Vitamins

Vitamin B: Vitamin B is the name of a group of various chemical compounds that is why it is known as vitamin B complex. It includes such vitamins as B_1, B_2, B_6 and B_{12}.

Vitamin B_1: It can be obtained from wheat. It is also present in vegetables, almond and pistachu Its deficiency in diet leads to weakness of muscles causing a disease known as beriberi.

Vitamin B_2: It can be obtained from diets full of cream butter, eggs and milk. Other than this they are found in liver, heart and kidney in large quantities. It is also found in meat and wheat. Deficiency of this vitamin leads to deficiency of blood causing a disease known as pernicious anemia. This vitamin is also needed for better digestion and proper functioning of nervous system. It also helps to synthesize hemoglobin. Deficiency of vitamin B_2 affects the growth of the children.

Vitamin B_{12}: It is obtained from milk, eggs and liver.

Vitamin C: It can be obtained from fresh citrus fruits like oranges, grape fruit and lemon. In addition it can also be obtained from banana, guava and other fruits. It is also found in tomatoes and other vegetables. Vitamin C deficiency lead to a disease known as scurvy.

Mineral Salts

In addition to organic compounds, our body also requires some inorganic compounds to maintain its proper functioning. These inorganic compounds are obtained from mineral elements present in our food and include calcium, iron, iodine, fluorine, magnesium and phosphorus. They perform a number of important functions in our body. Some of their functions are described below:

1. **Calcium** plays a vital role in blood clotting, transmission of impulses, contraction and relaxation of muscles and formation of bones.
2. **Iron** is a part of hemoglobin which is a transport protein and helps in the transport of oxygen to all the body cells. Deficiency of iron leads to anemia.
3. **Iodine** is required for the synthesis of thyroxine in the thyroid gland. Deficiency of it causes goiter and retards mental growth.
4. **Sodium** and **potassium** play very important role in generating nerve impulse. Sodium and chloride control different functions of body.
5. **Fluorides** are essential for healthy development of teeth.

4.2 Food and Energy

Energy is needed to maintain our daily activities, to maintain body temperature, to control all metabolic activities and for enhancing growth. Energy is produced from various food components such as carbohydrates, fats and proteins. The energy obtained from food is measured in terms of calories. Calorie is the unit of energy.

The amount of energy in different food components: Different food components provide different amount of energy to body. For example one gram of carbohydrates gives 4.1 K calories whereas the same amount of fats give approximately the double amount of energy i.e. 9.3 Kcalories. Different food sources give different amounts of energy. The table 4.1 shows the amount of energy present in various food items.

Table 4.1: The amount of energy in different food items

Food items	Kilo Calories/100 gm
Rice	348
Wheat	348
Pea	109
Potato	99
Brinjal	5
Cucumber	14
Banana	153
Dry fruits	655-549
Cow milk	65
Buffalo milk	117
Egg	180
Meat	194

Table 4.2: The amount of energy required by the people of different ages

Children age in years	Required Kilo calories	Men & Women	Required Kilo calories
1-3	1200	Women who do not work	2090
4-6	1600	Women doing hard work	3000
7-9	2000	Men who do not work	3400
10-12	2500	Men doing hard work	4500

Energy needs of a man depend on many factors. Most important of these factors are the rate of basal metabolism , body weight, sex, age, climatic condition and physiological condition.

Children need more energy than adults or old people. Old people need energy only for their repair and maintenance whereas children need energy not only for their repair and maintenance but for rapid growth and to cope the challenges of puberty. They have higher metabolic and growth rates than old people that's why they need more energy per kilogram of their body weight.

Men need more energy than women. Similarly, men who are actively engaged in physical hardwork need more energy than those who are not involved in physical labour.

Pregnant and lactating women need more energy than their normal counter parts. They require energy not only for themselves but also for their developing babies.

People living in hot climate need less energy to maintain their body temperature than those living in colder regions of the world. Normal body temperature of human beings is 37^0C, so more energy is required to maintain this constant temperature in cold climates or in colder months of the year.

4.3 Balanced Diet

Dietetics always emphasize to use a balanced diet but most of us are unaware of the exact definition of balanced diet. A balanced diet is one that contains well proportionate quantity of all the macro and micronutrients according to our body demands in such a way that neither any nutrient is in excess nor is deficient. A balanced diet maintains our health in such a way that we neither loose weight nor become overweight. A balanced diet varies according to the caloric needs of a person whereas the caloric needs depend on the weight, age, sex, body physiology and working condition of that person.

Diet for Infants

Milk is the best food for babies that contains all the necessary nutrients therefore breast feeding is matchless. It provides not only the nutrients but also the prepared antibodies to the infants. But if breast feeding is not possible under certain unavoidable circumstances then cow or buffalo milk can also be used. It is necessary to dilute it by adding two parts of water against one part of cow or buffalo milk. They can also be served with light solid foods such as cereals, egg yolk or boiled minced meat after fourth month of their life. Infants between 6 to 18 months should be given fruits and eggs in addition to milk.

Diet for Youngs:

They need more food as they are more active and agile. Their diet should have higher content of carbohydrate and fatty foods. As the young body is passing through rapid growth phase, they also need high protein diet. Balanced diet should strictly be administered between the age of 13-16 years. Milk and milk products should be an integral part of their food.

Diet for Old:

They require less energy than the above two categories for diminishing physical faculties. They should not use diets with higher fat contents. Instead they should take diet having moderete amount of proteins and carbohydrates.

Diet for Pregnant and Lactating Women

They need double the amount of food than an ordinary women as they have to fulfill the requirement of the developing embryo. If they do not take a well balanced diet, the development of the body may be affected and they will be born under weight. The pregnant women should therefore, take a balanced diet with high protein profile, vitamins and minerals. Lactating women should also use milk, sugar, fats, wheat, fruits and eggs regarding so that they should fulfill energy demands of their breast-feeding offspring.

4.4 Coordination and Integration in Body Functions

All the living organisms are bestowed with some common characteristics. One of them is to respond the stimulus. Whether the stimuli are extrinsic or intrinsic, at cell, tissue, organ or body level. Coordination and integration in various human body functions to respond to these stimuli is of extreme importance.

The coordination and integration in human body is brought about by two systems. One of these is nervous system while the other is endocrine system. Nervous system consists of brain, spinal cord and two types of nerves. These nerves interpret the internal and external stimuli and show suitable response. In addition to showing response they also coordinate between different organs. Endocrine system comprises of ductless glands which secrete secretions known as hormones. These glands also receive the internal and external stimuli through nervous system and secrete hormones. These hormones are helpful in coordinating the functions of different organs and also show response. The hormones are the chemical messengers that are transported from their site of synthesis to their site of action through blood and bring about coordination in body functions.

Endocrine glands

Following endocrine glands are present in our body.

Pituitary Gland

It is a small gland equal to the size of pea. It is attached to the brain. As this gland controls the activities of all other glands, it is also known as “Master gland”. This gland controls the growth and many activities of the body.

Thyroid Gland

It is situated in the neck region on the front of trachea. It secretes two types of hormones. The hormone thyroxine needs iodine for its secretion. These hormones bring normal body growth and control calcium level in blood. The deficiency of iodine causes thyroid to increase in size than normal and results in goiter.

Adrenal Glands

These glands are in the form of a pair, each member lying above the upper end of kidney. Both parts secrete different hormones. The hormones of adrenal cortex control glucose level in the blood and maintain balance in the sodium and water concentration in the body. The hormones of adrenal medulla control the involuntary actions of the body. They prepare the human body to face emergency situations like fear, light or sorrow. They increase heart beat and metabolic rate of human body.

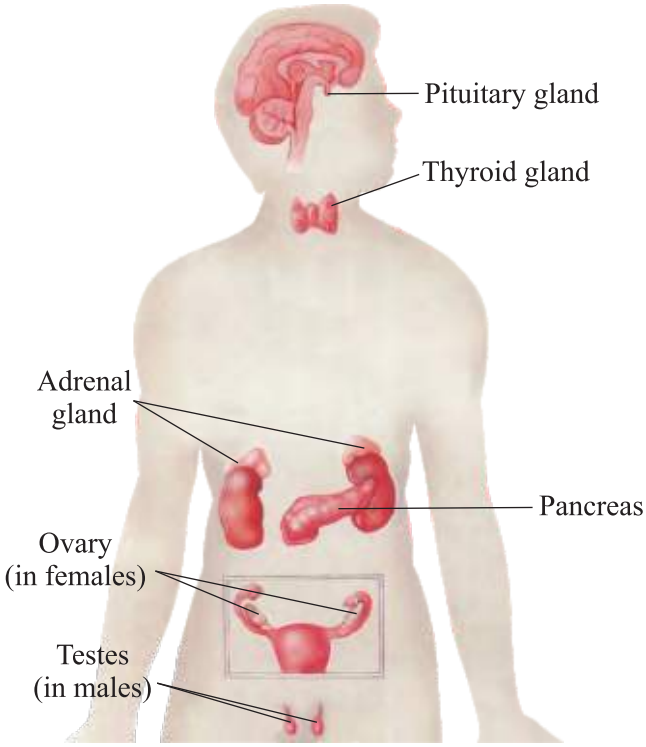


Fig. 4.2: Various endocrine glands

Pancreas

Pancreas is a long, soft and leaf like organ present below the stomach at the junction of lower end of stomach and small intestine. It synthesizes two hormones: the insulin and glucagon. Both these hormones function antagonistically to control the sugar level while glucagon works in an opposite manner and increases the blood sugar level. Under secretion of insulin causes diabetes in human.

Gonads

The sex organs are called as gonads. The hormones of **testes** are responsible for the development of male sex organs and secondary male sex characters. For example increase in size of larynx and change of voice in body. In addition they also play a role in the appearance of hairs on the face and body.

The hormones of **ovary** are responsible for the development of female sex organs and secondary female sex characters.

4.5 Different Stages of Human Life

Human beings pass through various stages in their life infancy, childhood, youth and old age.

Infancy:

This stage spans over the first two years in the life of every human being. This is an important phase in human life. It is characterized both by physical and mental development of a child. A child gains enough weight during the first 24 months of its life. It starts teething and learns to walk and speak. It starts differentiating colours and shapes in just first three months of its

life. In the beginning they just move their hands and legs but later start curling on the belly. Normally an average baby starts walking after 13 to 15 months of its birth.

Childhood:

Early childhood extends from two to six years. It is a period of great revolution in the thoughts and memory of a child. A child becomes capable of understanding his own feelings and his relationships with others. This period is characterized by mental, physical and behavioral development of the child.

The period after childhood extends from six to twelve years of life. In this period such qualities as power of decision, reasoning and arguments, social and self understanding reaches at its peak.

Adolescence

This stage is a period of physical, psychological and social development of a child which covers the part of life between 13 to 19 years of age. During this phase a child enters the youth age. As this period acts a bridge between childhood and youth so the signs of adulthood start appearing in the child. This is commonly known as puberty.

Youth and Old Age

Man after completing all the stages of childhood and adolescence gradually enters the youth age. At this stage certain negative changes start occurring in its body and the rate of catabolism exceeds the rate of anabolism . This leads to weakening of the body and it becomes difficult for the body to cope with negative external and internal changes. The phenomenon of getting old is called as **aging**. As these negative changes continue to proceed in the body gets weaker and weaker and a stage is achieved when our body systems stop functioning and finally the death occurs.

Aging greatly affects heart and its associated vessels as their elastically decreases. The blood pressure is raised and thus the chances of hemorrhage increase. Bones become weak and fragile due to gradual loss of organic matter.

4.6 Exercise and Health

Whether you are doing exercise alone or in group, it is always a happy experience. Exercise maintains the elasticity of the body and due to this elasticity the muscles and joints

Fig. 4.3: The children doing exercise

never get strained. When the muscles are strong, a person can perform tough physical jobs. Strong muscles not only help to perform strenuous physical tasks but also provide support to our bones and joints.

People who do not take exercise are unable to burn their excess fat energy that accumulates in their body. Such people become obese. Exercise is the only way to save yourself from obesity as it helps to burn all the supply of energy.

Every one can take exercise, even the people suffering from heart disease and diabetes can take exercise after consulting their physician.

We are Muslims . We are naturally benefitted by our prayers both physically and spiritually. Prayer is also a light exercise during which almost all the muscles of the body move. During prayer the metabolism of muscles increases due to their increased energy needs.

4.7 First Aid

First aid is a help given at the place of accidents till the patients reach the hospital to save their life.

Fig. 4.4: First aid box

Animal Bite

If any animal bites or scratches the body of a person, it may be dangerous. The wound may become infected. When a kitten scratches the body of a person, the bacteria enter into his body that may cause rabies or tetanus. Sometimes the scratched or bitten part of the body may also bleed. In such cases pressure bandage should administered until it stops bleeding. This is only possible if it is a minor injury. Cover the damaged area with clean cotton or piece of cloth. Patient should immediately be taken to the hospital.

Burn

Every year thousands of people die of burning. If some part of the body burns then put off the cloths from the burnt part. Run off the tap water on burnt area. Do not administer butter, grease, oil, tooth paste, egg or any cosmetic powder on the burnt area. In case of severe injury rush to the nearest hospital.

Fig. 4.5: Run off the tap water on burnt area

Eye Injury

Ordinary irritation in the eye stops by washing it in clean tap water. If sand or dust particle enters in the eye do not rub it as it may injure the upper protective covering of the eye. Eye should be washed carefully to remove the dust or sand particle. If this cannot be done by yourself take the help of some first-aider who should first of all clean his own hands. He should open the eye of the patient to have a close look in it. Take the patient to wash basin and wash the eye carefully by opening the eye lids so that the particle or hair is removed. If the dust or sand particle still persists and irritation continues, the patient should be taken to the hospital.

Coma

The state of coma can be very seriously dangerous in the life of a patient in two ways. During coma, the tongue may stick to the palate resulting to suffocation or heart may stop functioning. So in coma, first the breathing must be ensured. If the patient is breathing , lay it straight without any pillow below the head. Lift the legs and arms towards the head and take the patient to the hospital.

Fig. 4.6: Lifting of the chest cavity if the patient is breathless

If the patient is breathless lift the chest of the patient slightly upward so that the respiratory tract may become straight. Open the mouth of the patient and remove any blood, vomiting or secretion accumulated in the mouth. Clean the mouth with your fingers or handkerchief. The respiratory pathway become clear and the patient may start breathing. If the patient is still breathless, try to breath it artificially. If breathing starts take the patient to the hospital.

Snake Bite

If snake bites then immediately take the following steps:

1. Tie up the arm or leg tightly with some rope or cloth so that poison may not move further.
2. Wash the wound with water.
3. Lay down the patient and restrict its movement.
4. Don't try to suck the patient's blood as it may prove fatal to the first aider.
5. Let the wound bleed.
6. Take the patient to hospital as soon as possible so that some antivenome drugs should be administered.

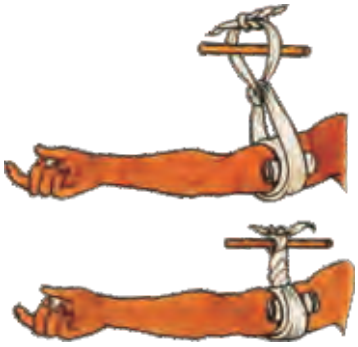


Fig. 4.7: Tie up the arm tightly in case of snake bite

IMPORTANT POINTS

- The major components of human food are carbohydrates, lipids, proteins, vitamins and mineral salts.
- Carbohydrates are the primary source of energy for all the animals.
- Fats and oils are formed by chemical combination of fatty acids and glycerols.
- All the proteins are made up of amino acids.
- Vitamin A,D,E and K are fat soluble while B and C are water soluble.
- All the endocrine glands bring about coordination in the body.
- A man passes through various stages like infancy, childhood, adolescence, youth and old age.
- Exercise is necessary to maintain human health.
- In case of emergency first aid should be administered as it may improve the chances of survival of the patient.

GLOSSARY

Fat Soluble Vitamins	The vitamins that dissolve in fat e.g. vitamin A,D,E and K.
Endocrine Glands.	The glands whose secretions are transported through blood.
Hormones	These are the chemical messengers secreted by the endocrine glands and transported through the blood to their site of action.

QUESTIONS

Q1. Fill in the blanks

(i) The most abundant naturally occurring carbohydrate of the world is _____ .
(ii) Fats and oils are formed by chemical combination of fatty acids with _____ .
(iii) Deficiency of vitamin _____ causes night blindness.
(iv) Goiter is caused by the deficiency of _____ .
(v) Insulin and _____ are formed in pancreas.
(vi) Rabies is caused by _____ bite.

Q. 2 Place (✓) in front of correct statement and (✗) in front of wrong statement.

(i) Glucose is the building block of proteins.
(ii) Vitamin A is a fat soluble vitamin
(iii) Rickets is caused by vitamin C deficiency.
(iv) One gram of fat gives 4.1 kcal of energy.
(v) Thyroxin hormone is secreted by parathyroid gland.

Q3. Encircle the correct answer from multiple choices

(i) The compound which is required in very small amount is
(a) Carbohydrate (b) Proteins (c) Fats (d) Vitamins

(ii) The amount of energy gained from one gram of fats is
(a) 9.3 Kcal (b) 18 Kcal (c) 27 Kcal (d) 36 Kcal

(iii) The disease which is caused in children due to vitamin D deficiency is
(a) Scurvy (b) T.B. (c) Rickets (d) Anaemia

(iv) The hormone which controls involuntary action of body is
(a) Thyroxin (b) Epinephrine (c) Adrenal (d) Insulin

(v) The disease caused by deficiency of iodine is
(a) Goiter (b) Night blindness (c) Malaria (d) Cough

Q4. Short Questions:

(i) What are the basic components of food?
(ii) What is the role of vitamin B in body?
(iii) What is the role of iron in the body?
(iv) Which disease is caused by dog bite?
(v) What is the role of insulin?

Q5. Write a note on important components of food.
Q6. What do you know about protein?
Q7. What are vitamins? Describe them in detail.
Q8. What is balanced diet?Describe the balanced diet for various people of our society.
Q9. Why exercise is important for health?
Q10. Discuss the role of various endocrine glands in our body.