CHAPTER # 08
NUTRITION
CLASS IX

Define the following terms

(i) Vitamins

Any of a group of organic compounds which are essential for normal growth and nutrition and are required in small quantities in the diet because they cannot be synthesized by the body.

(ii) Malnutrition

A condition that results from lack of sufficient nutrients in the body. This causes fatigue, dizziness and growth related problems.

(iii) Goiter

Goiter is a condition in which thyroid gland becomes enlarged and it results in swelling in neck. Goiter is caused by an insufficient amount of "Iodine" in diet.

(iv) Anemia

The term anemia literally means "a lack of blood". The condition is caused when number of red blood cells reduced to a level lower than normal.

(v) Constipation

Constipation is a condition, where a person experiences hard faeces that are difficult to eliminate.

(vi) Obesity

It is a medical condition in which excess body fat has accumulated to the extent that it may have a negative effect on health.

(vii) Starvation

It is a severe deficiency in caloric energy intake. It is the most extreme form of malnutrition.

(viii) Ingestion

The process of taking a material (e.g. foodstuff) into the mouth or body.

(ix) CHYME

The semifluid mass of partly digested food expelled by the stomach into the duodenum.

(x) Ulcer

An ulcer is a painful sore that takes a long time to heal and can recur.

Distinguish between the following in tabulated form.

(i) Fat-soluble vitamins and water soluble vitamins

Parameters of Comparison	**Water Soluble Vitamins**	**Fat Soluble Vitamins**
Meaning	These are vitamins that are capable of dissolving in water.	These are vitamins that are capable of dissolving in fat.
Affinity to Water	Hydrophilic	Hydrophobic
Toxicity	Low	Comparatively more
Body Storage	Not usually	Yes
Deficiency	Symptoms appear quickly.	Symptoms are slower to develop
Need for Daily Consumption	Yes	No
Vitamins	B, C	A, D, E, K

(ii) MARASMUS AND KWASHIORKOR

Kwashiorkor	Marasmus
Causes	
Deficiency of proteins.	Deficiency of both proteins and calories.
Age factors	
Between the age of 6 months and 3 years of age.	Between the age of 6 months and 1 year of age.
Weight loss	
There is some weight loss.	There is severe weight loss.
Symptoms	
The thinning of muscles and limbs.	The thinning of limbs.
Fatty liver cells	
There is an enlargement in the fatty liver cells.	There is no enlargement in the fatty liver cells.
Appetite	
Voracious feeder.	Poor appetite.
The texture of the skin	
Flaky paint appearance on the skin.	Dry and wrinkled skin.

Autotrophic Nutrition	Heterotrophic Nutrition
The organisms are capable of preparing their own food using simple substances that are available in their surroundings.	The organisms completely depend on others for their nutrition. They depend on surrounding plants and animals for food.
The conditions necessary for autotrophic nutrition are carbon dioxide, water, chlorophyll and water.	They cannot make the food from available inorganic substances like carbon dioxide, water and sunlight.
Phototrophic and Chemotrophic are the two types of autotrophic nutrition	Holozoic, parasitic, symbiotic association, and saprophytic are the four types of heterotrophic nutrition
Plants are an example of autotrophic nutrition	Animals and some plants are an example of heterotrophic nutrition

(iii) Inorganic fertilizers and organic fertilizers

In Organic fertilizer	organic fertilizer
Inorganic fertilizers contain synthetic materials	Organic fertilizers contain naturally degradable compounds.
Naturally occurring materials which are not chemically modified called inorganic fertilizer.	Chemical substances which are more complex and takes time to be broken down into useable form called organic fertilizer.
Inorganic fertilizer can burn plants and excess use of fertilizer may cause toxicity in the soil.	Organic manure increase the quality of soil, but yield will be lower

Organic fertilizer examples- include green manures, livestock manure, compost, household waste, crop residues, and woodland litter.	Inorganic fertilizers include phosphate, lime, rock, potash etc.

Write short answers of following questions.

(i) Why fertilizers are necessary for plant?

Fertilizers are substances containing chemical elements such as manure or mixture of nitrates that improves the growth of plants. When added to soil or water, plants can develop tolerance against pests like weeds, insects and diseases.

(ii) How stomach linings are protected from acidic environment?

Glands in the stomach lining produce about 3 quarts (2.8 liters) of these digestive juices each day. When food enters into the stomach the gastric juice is secreted by gastric glands found in the stomach wall. It is composed of mucous, hydrochloric acid and protein digesting enzyme pepsinogen.

(iii) Why nitrogen is essential for plants?

Nitrogen is essential for plants to synthesize amino acids, which are the building blocks for protein synthesis and also required for the production of chlorophyll, nucleic acids, and enzymes.

(iv) Why fats are called most efficient form of food?

Fats are the slowest source of energy but the most energy-efficient form of food. The body deposits excess fat in the abdomen (omental fat) and under the skin (sub cutaneous fat) to use when it needs more energy.

(v) Why grinding and lubrication are necessary for swallowing?

Grinding is useful because esophagus can pass only small pieces through it as well as enzymes cannot act on large pieces of food while lubrication adds water and mucus to the food. Partial digestion of starch by saliva which contains an enzyme salivary amylase.

Write detailed answers of the following questions.

(i) Describe environmental hazards related to chemical fertilizers.

ENVIRONMENTAL HAZARDS RELATED TO CHEMICAL FERTILIZERS

An environmental hazard is a condition, which has the potential to threat natural environment or adversely affect people's health, including pollution and natural disasters.

1. Soil nutrient holding capacity:

The massive quantities of inorganic fertilizers affect the soil nutrient holding capacity.

2. Eutrophication:
   The high solubility of fertilizers also degrade ecosystem through eutrophication (means an increase in chemical nutrients typically compounds containing nitrogen or phosphorus in an ecosystem).
3. Emission of greenhouse gas:
   Storage and application of some nitrogen fertilizers may cause emission of greenhouse gas, e.g nitrous oxide.
4. Oil acidity:
   Ammonia gas (NH) may be emitted from applied inorganic fertilizers. This extra ammonia can also increase soil acidity.
5. Pest problems:
   Excessive nitrogen fertilizers can lead to pest problem by increasing their reproduction rate.

(ii) Describe function of stomach and intestine with suitable diagram of human digestive system.

FUNCTIONS OF STOMACH

Stomach is j-shaped thick walled, expandable bag, located in the left of abdomen just beneath the diaphragm.

The stomach muscles churn and mix the food with acids and enzymes, breaking it into much smaller, digestible pieces. An acidic environment is needed for the digestion that takes place in the stomach. When food enters into the stomach the gastric juice is secreted by gastric glands found in the stomach wall

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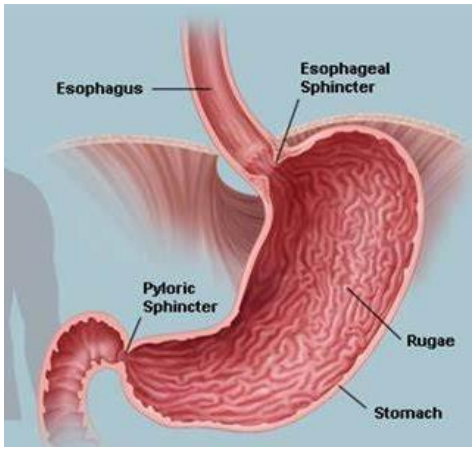
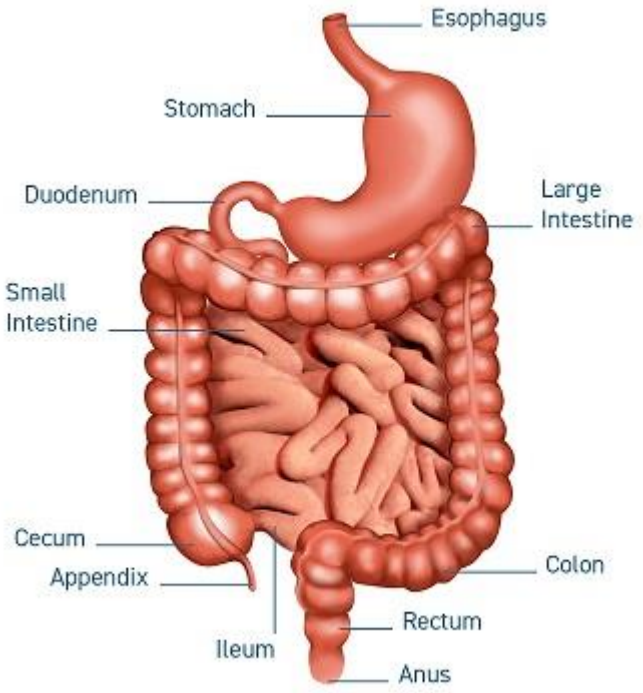


FUNCTION OF INTESTINE

The intestines include the small intestine, large intestine, and rectum. The small intestine (small bowel) is about 20 feet long and about an inch in diameter. Its job is to **absorb most of the nutrients from what we eat and drink**.

The small intestine or small bowel is an organ in the gastrointestinal tract where most of the absorption of nutrients from food takes place. It lies between the stomach and large intestine, and receives bile and pancreatic juice through the pancreatic duct.



(iii) What are vitamins? Describe types of vitamins.

VITAMINS

Vitamins are chemical compounds that are required in low amounts but are essential for normal growth and metabolism.

TYPES

Vitamins may be divided into two groups

FAT-SOLUBLE VITAMINS

Vitamin which can soluble in organic solvent are called Fat-soluble vitamins (A, D, E and K) are less excreted from the body as compared to water-soluble vitamins.

WATER SOLUBLE VITAMINS

Vitamin which are soluble in H O. These 2 are vitamins B and C. Cooking or heating destroys the water soluble vitamins more readily than the fat-soluble vitamins.

(iv) Describe mineral deficiency diseases in human.

MINERAL

A class of naturally occurring solid inorganic substances with a characteristic crystalline form. Minerals are vital for proper human health.

Mineral deficiency disease: Diseases resulting from deficiency of a mineral are relatively rare among humans some are given below;

1. GOITER:

Goiter is a condition in which thyroid gland becomes enlarged and it results in swelling in neck. Goiter is caused by an insufficient amount of “Iodine” in diet. Iodine is used by thyroid gland to produce hormones that control the body's normal functioning and growth.

2. ANEMIA (MOST COMMON OF ALL MINERAL DEFICIENCY DISEASES):

The term anemia literally means “a lack of blood”. The condition is caused when number of red blood cells reduced to a level lower than normal. Hemoglobin molecule contains four atom of iron. A person becomes weak and there is shortage of oxygen supply to body's cells.

3. Over intake of nutrients:

It is a form of malnutrition in which more nutrients are taken than the amount required for normal growth, development and metabolism. High intake of carbohydrates and fats leads to obesity, diabetes and cardiovascular problems. Similarly, high dose of vitamin A causes loss of appetite and liver problems. Excess dose of vitamin D can lead to deposition of calcium in various tissues.

(v) Describe effects of malnutrition on human.

EFFECTS OF MALNUTRITION ON HUMAN

Malnutrition hurts people both mentally and physically.

1. STARVATION:

It is a severe deficiency in caloric energy intake. It is the most extreme form of malnutrition. In humans, prolonged starvation can cause permanent organ damage and eventually, death.

2. HEART DISEASES:

Heart diseases usually caused by unbalanced diet, fatty foods increase blood cholesterol level.in this disease blood vessels become narrowed or blocked that can lead to a heart attack, chest pain (angina) or stroke.

3. CONSTIPATION:

A condition in which there is difficulty in emptying the bowels, usually associated with hardened faeces.it is due to irregularity and unscheduled meal.

4. OBESITY:

Obesity is most commonly caused by a combination of excessive food intake, lack of physical activity. Obesity is known as mother-disease and may lead to heart problems, hypertension, diabetes etc.

ADDITIONAL QUESTIONS

Describe types of organisms on the basis of nutrition?

Ans. **TYPES OF ORGANISMS**

There are two types of organisms on the basis of nutrition.

i) AUTOTROPHIC ORGANISMS

The organisms which prepare their own food from inorganic elements are called autotrophic organisms. e.g, some bacteria, all algae and all plants. They obtain water carbon dioxide and minerals from their environment and prepare their food. This food is then used for growth and energy as well.

ii) HETEROTROPHIC ORGANISMS

The organisms which obtain their food from other organisms are called heterotrophic organisms e.g., Most bacteria and all protozoans fungi and animals. They use food for growth and energy.

What is balanced diet? How would you relate it with age, sex and activity?

BALANCED DIET

"The diet, which contains all the essential nutrients like carbohydrates, fats, proteins, minerals, vitamins in the correct proportion for the normal growth and development of the body is called a balanced diet."

A BALANCED DIET IS RELATED TO AGE, SEX AND ACTIVITY

Energy requirements change through life and depend on many factors, such as: Age; Sex and Level of activity.

The key stages in life include:

CHILDHOOD

The energy requirements of children increase rapidly because they grow quickly and become more active. Young children do not have large stomachs to cope with big meals.

ADOLESCENCE

is a period of rapid growth and development and is when puberty occurs. The demand for energy and most nutrients are relatively high. Boys need more protein and energy than girls for growth.

ADULTHOOD

a good supply of protein, calcium, iron, vitamin A and D, as part of a healthy, balanced diet, are important. Calcium is needed for healthy tooth development, and together with vitamin D, can help develop strong bones.

Write the Functions, chemical names and deficiencies of important vitamins.

Vitamin generic name	Deficiency diseases
Vitamin K	Bleeding disorder
Vitamin D	Rickets and osteomal
Vitamin C	Scurvey
Vitamin B	Beriberi
Vitamin A	Night blindness, eye-infection, rough skin, respiratory infections

Define the following.

(i) PARASITIC NUTRITION:

Parasitic organisms, or parasites, live on or inside other living organisms, called hosts, and obtain their food from them. The host does not get any benefit from the parasite. This mode of nutrition is called parasitic nutrition.

EXAMPLE:

Hookworms, tapeworms, leeches, etc., have different modes of feeding, depending upon habit, habitat and modifications.

(ii) **Saprotrophic nutrition**:(Gr: Sapros=rotten, Trophic=nutrition)

Saprotrophic organisms, or saprotrophes, derive their food from dead and decaying organic material. This mode of nutrition is called saprotrophic nutrition. They secrete enzymes that are released on food material outside their body. These enzymes break down complex food into simple forms.

EXAMPLES

Moulds, mushrooms, yeasts and many bacteria.

(iii) **Holozoic nutrition:** (Gr:Holo=Whole, Zoikos=of animal)

In holozoic nutrition complex organic substances are ingested (taken in) without their being degraded or decomposed. After intake, such food is digested by enzymes produced within the organism. Digested food is absorbed into the body and the undigested product is egested (expelled out) from the body.

EXAMPLE

Non-parasitic animals-simple ones like Amoeba and complex ones like human beings.

Describe the digestive system of human?

THE DIGESTIVE SYSTEM OF HUMAN

Digestion is the process in which large and non-diffusible molecules of food are converted into smaller and diffusible molecules that can cross the membranes.

ALIMENTARY CANAL OF HUMAN:

The digestive system is made up of the alimentary canal and the other abdominal organs that play a part in digestion. The alimentary canal (also called the digestive tract) is the long tube of organs - including the esophagus, stomach, and intestines - that runs from the mouth to the anus. An adult's digestive tract is about 30 feet (about 9 meters) long.

The digestion consists of following steps:

INGESTION: INTAKE OF FOOD.

PROPULSION: Peristalsis-alternate waves of muscular contraction and relaxation in the primary digestive organs. The end result is to squeeze food from one part of the system to the next.

MECHANICAL DIGESTION:

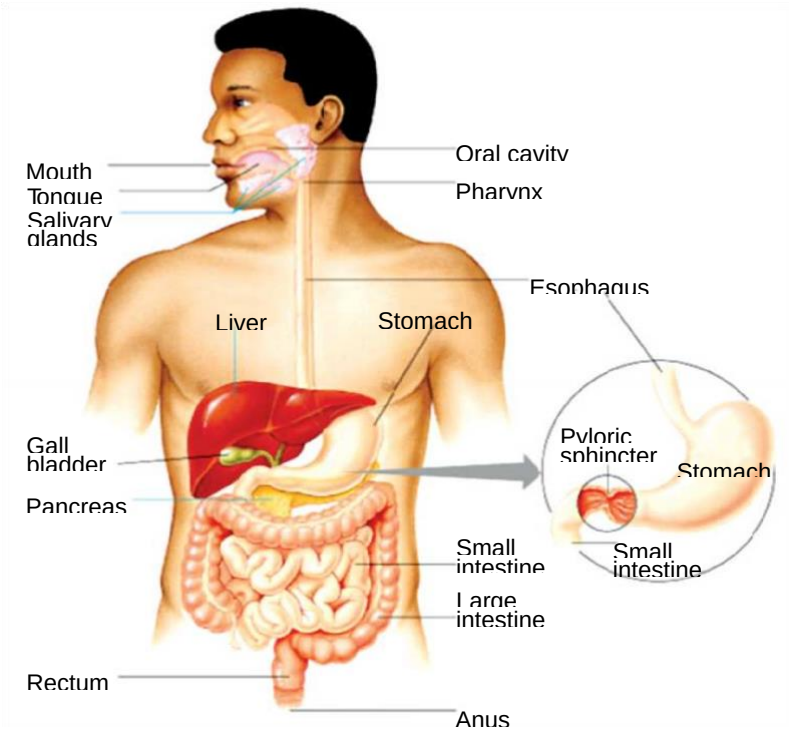
Physical preparation of food for digestion.

SEGMENTATION: Mixing of food in the intestines with digestive juices.

CHEMICAL DIGESTION: Carbohydrates, Fat, and Proteins are broken down by enzymes.

ABSORPTION: Transfer of the digested portion of food into the blood from the digestive canal.

EGESTION (Defecation): Removal/elimination of the waste products from the body.



What is the function of oral cavity?

FUNCTIONS OF ORAL CAVITY

Digestion begins in the oral cavity, well before food reaches the stomach. When we see, smell, taste, or even imagine a tasty snack, our three pairs of salivary glands, which are located under the tongue and near the lower jaw, begin producing saliva. This flow of saliva is coordinated with a brain reflex that triggered when we sense food or think about eating.

Oral cavity is the space behind mouth in-between upper and lower jaw and has many important functions:

FOOD SELECTION:

When food enters the oral cavity it is tasted and felt. Here food is selected or rejected due to the taste, hard object or dirt. Smell and vision also help in selection.

GRINDING OF FOOD:

The second function of oral cavity is the grinding of food by teeth. It is known as chewing or mastication.

LUBRICATION OF FOOD:

The third function of the oral cavity is lubrication of food by mixing saliva secreted by saliva. It has two main functions. (i) Adds water and mucus to the food. (ii) Partial digestion of starch by saliva which contains an enzyme salivary amylase.

CHEMICAL DIGESTION:

Saliva contains an enzyme salivary amylase which helps in the digestion of starch partially. Than the pieces of food are rolled up by the tongue into small, slippery, spherical mass called bolus.

SWALLOWING OF THE BOLUS:

Swallowing is accomplished by muscle movements by the tongue and mouth, food moves into the throat, or pharynx.

What is the function of pharynx and oesophagus?

FUNCTIONS OF PHARYNX AND OESOPHAGUS

The pharynx, a passageway for food and air, is about 5 inches (12.7 centimeters) long. A flexible flap of tissue called the epiglottis reflexively closes over the windpipe when we swallow to prevent choking. From the throat, bolus travels down a muscular tube in the chest called the esophagus.

Waves of rhythmic movements of muscle contractions and relaxation called peristalsis force down food through the oesophagus to the stomach. A person normally isn't aware of the movements of the esophagus, stomach, and intestine that take place as food passes through the digestive tract.

At the end of the oesophagus, a muscular ring called a sphincter allows food to enter the stomach and then squeezes shut to keep food or fluid from flowing back up into the oesophagus.

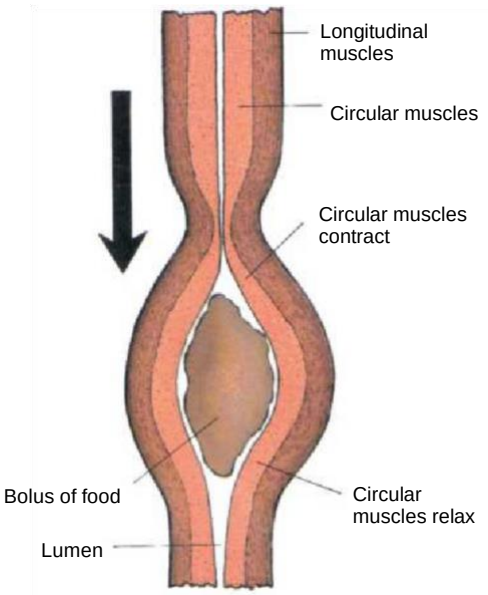


Figure 8.17 Peristalsis

What is the function of small intestine?

FUNCTIONS OF SMALL INTESTINE

The small intestine is made up of three parts:

- The duodenum, about 25 cm (10 inches) long, C-shaped first part.
- The jejunum, the coiled mid-section.
- The ileum, the final section that leads into the large intestine.

The inner wall of the small intestine is covered with millions of microscopic, finger-like projections called villi (singular, villus). Each villus is connected and richly supplied with blood capillaries and lymphatic vessels, i.e lacteal. The walls of villus are made up of only one layer of cells, in thickness. The villi are the vehicles through which nutrients can be absorbed into the body. They increase the surface area over which absorption and digestion occur. These specialized cells help absorbed materials cross the intestinal lining into the bloodstream.