



(BIOLOGY NOTES)

Nutrition

Nutrition

- The sum total of all the processes from taking the food upto its utilization is called **nutrition**.

Food

- The material, which is required by all living organisms for the production of energy, growth, repairing of tissues and regulation of other life processes.

Balanced Diet

- Diet that contains all the components in the optimum proportions and quantity required for maintaining the body in perfect state of health, activity and development.
- Various components of balanced diet are carbohydrates (60%), fats (25%), proteins (15%), vitamins, mineral, roughage and water.

1. Carbohydrates

- Main constituents of carbohydrates are C, H and O.
- They can be **monosaccharides** (eg, glucose) **disaccharides** (eg, sucrose, lactose, maltose), **oligosaccharides** and **polysaccharides** (eg, glycogen, starch, cellulose).
- Its 1.0 gm gives 4 kcal energy.
- On eating, carbohydrates are processed in the alimentary canal and liver and supplied to the tissue in the form of glucose.
- Living cells receive carbohydrate from blood mostly as glucose.
- Excess of glucose is stored in liver and muscles as glycogen, *ie*, **glycogenesis**.
- When level of blood glucose fall, glycogen of liver is hydrolyzed to produce it, *ie*, **glycogenolysis**.
- Excess carbohydrate of food is changed into fat through the process of **lipogenesis**.
- Cereals (wheat, rice and maize), sugarcane, milk (lactose, sugar), fruits, honey, beet etc are the source of carbohydrates.
- Daily requirement of an adult is 500 g, while growing child, nursing mother and sport-persons needed more carbohydrates.

2. Lipids

- Lipids are of two types : **simple** (eg, fat and oil) and **compound** (eg, lecithin, glycolipid).

- Provides two times more energy (9 kcal/g) than carbohydrates.
- Fat is the major stored food kept in adipose tissue.
- Stored food is used as fuel when glucose is not available.
- Lipase enzyme digests fats and break it into fatty acids and glycerol.
- There are two types of fatty acids. **Saturated** (solid at room temperature) and **unsaturated** (liquid at room temperature).
- Our diet should contains less saturated fats (butter, ghee, hydrogenated vegetable oils etc) in comparison to unsaturated fats (simple vegetable oil).
- Excess of saturated fats in diet may lead to heart attack as they increase blood cholesterol and the disease known as **hypercholesterolemia**.
- Human diet should have more unsaturated fatty acids as they cannot synthesized in the body itself. Such fatty acids are called **essential fatty acids** (eg, linoleic acid, linolenic acid, etc).
- Fat functions as a cushion and shock absorber for eye balls, gonads, kidney, etc.
- Excess of lipids causes obesity, blood pressure and a number of cardiac problems.
- Daily requirement of an adult is 50 g.

3. Proteins

- They are made up of carbon, hydrogen and oxygen.
- Play a vital role in growth, development and repair of the body.
- Proteins are polymers of amino acids.
- Amino acids are of two types :
 - (i) **Essential** : These cannot synthesized in the body and must be taken in diet, eg, lysine, methionine, valine, tryptophan, phenylalanine, etc.
 - (ii) **Non-essential** : Synthesized in the body and do not need to be taken from outside, eg, alanine, arginine, aspartic acid, glutamine, cysteine, proline, serine, hystidine, tyrosine.
- Proteins first broken down in amino acids then digest.
- 1.0 g of proteins may yield 5.65 kcal energy.
- Daily requirement of protein is 70-100 g.
- They build up various protoplasmic structures including cell membrane.
- Haemoglobin, visual pigments and cytochromes, all are proteins.

- Blood contains proteins for different functioning including blood clotting and antibodies, eg, gamma globulins.
- Main sources are groundnuts, soybean, meat, pulses, fish, egg, etc.

4. Minerals

- Metals and non-metals and their salts are called minerals.

(i) Sodium (Na) and Potassium (K)

- Main cation of extracellular and intracellular fluids.
- Sodium helps in absorption of glucose, and electro chemical impulse conduction in nerves and muscles.
- Potassium takes part in muscles and nerves activity glycogen and protein synthesis.
- Deficiency of sodium and potassium causes cramps and convulsions respectively.
- Source : Salt (namak), milk, vegetables, etc.

(ii) Chlorine (Cl)

- Main anion of extracellular fluid.
- Helps in synthesis of HCl and acid base balance.
- It is essential for both plants and animals.
- Its main sources are salt, sea food and chlorinated water.

(iii) Magnesium (Mg)

- Enzyme activator.
- Component of bones and teeth.
- Deficiency produce convulsion and hallucinations.

(iv) Sulphur (S)

- Main constituent of many proteins, enzymes and coenzymes.
- It is a component of some hormones, eg, insulin.
- It is essential for healthy hair, skin and nails.
- Main sources are meat, milk products, eggs, etc.

(v) Cobalt (Co)

- A component of vitamin-B₁₂.
- Present in milk and meat.
- Deficiency causes pernicious anaemia.

(vi) Fluorine (F)

- Maintain enamel and checks dental decay.
- In excess, harmful to teeth and bones, ie, fluorosis.
- Present in milk and drinking water.

(vii) Calcium (Ca)

- Major component of bones and teeth.
- Required for blood clotting and muscles contraction and heart functioning.
- Required more in children and pregnant ladies.

- Present in milk, green vegetables, gram, fish, etc.
- Deficiency causes rickets and muscles spasms.

(viii) Iodine (I)

- Essential for production of thyroxine hormone of thyroid gland.
- Deficiency causes goitre.

(ix) Phosphorus (P)

- Alongwith calcium, it occurs in bones and teeth.
- Component of nucleic acids, phospholipids and ATP.
- Deficiency reduces growth, metabolism and causes rickets in children.

(x) Iron (Fe)

- Component of haemoglobin.
- Needed more in girls as compare to boys (25 mg as girls lose (35 mg) more blood during menstrual cycle.
- Deficiency leads to anaemia in girls.
- Sources are green leafy vegetables like spinach, *Chenopodium*, methi, etc.

5. Vitamins

- These are accessory food factors, required in small quantity for controlling metabolism and body functioning. They do not provide energy.
- Term vitamin was coined by **C Funk** in 1912.
- Vitamins are of two types—fat soluble (A, D, E and K) and water soluble (B and C).

6. Roughage

- It is fibrous matter present in food.
- These fibrous matter cannot digest hence, do not take part in growth.
- It maintain water proportion inside the body.
- Its sources are—salad, outer layer of grains.
- Vegetables and porridge (dalia).

7. Water

- Human body contains about 60%–80% water.
- It regulates body temperature by sweating and evaporation.
- It also helps in digestion, transportation and excretion.

Different types of Vitamins, their Sources, Functions and Symptoms

S. No.	Vitamin	Common source	Function	Deficiency symptom
1.	Vitamin-A (Retinol)	Milk, butter, eggs, fish oil and vegetables	Forms retinol pigments (rhodopsin of rod cells) and iodopsin of cone cells of eye.	Nightblindness (no vision in dim light)
2.	Vitamin-B₁ (Thiamine)	Yeast, wheat germ, peanuts, beans	Essential for normal carbohydrate metabolism and functioning of nervous system	Beri-beri (weakness of limb muscles)
3.	Vitamin-B₂ (Riboflavin)	Liver, milk, cheese, leafy vegetables	Part of coenzymes, maintains healthy skin and oral mucosa	Cheilosis (fissures in skin)
4.	Vitamin-B₃ (Pantothenic acid)	Yeast, milk, groundnut, tomatoes, liver, kidneys, egg yolk	Main component of coenzyme-A, play various metabolic roles especially in pyruvate into acetyl Co-A for Krebs' cycle.	Deficiency is rare due to its abundance
5.	Vitamin-B₅ (Niacin)	Wheat, meat, peanuts, yeast	Carbohydrate metabolism	Pellagra (swollen lips and pigmented skin)
6.	Vitamin-B₉ (Folic acid)	Liver, green vegetables, banana	Nucleic acid metabolism, maturation of RBCs	Macrocytic anaemia
7.	Vitamin-B₁₂ (Cyanocobalamin)	Eggs, fish, liver	Promote DNA synthesis, Maturation of RBCs	Pernicious anaemia
8.	Vitamin-C (Ascorbic acid)	Citrus fruits, tomatoes, leafy vegetables	Formation of collagen	Scurvy (bleeding of gums, teeth falling)
9.	Vitamin-D (Calciferol)	Fish liver oil, sunlight, milk, eggs yolk	Ca and P deposition in bones and teeth	Rickets in children (bent and weak bones), while osteomalacia in adults
10.	Vitamin-E (Tocopherol)	Leafy vegetables, vegetable, oil, cereal grain	Keeps skin healthy, maintains RBCs	Destruction of RBCs, reproductive failure
11.	Vitamin-K (Phylloquinone)	Leafy vegetables, soybean oil	Normal blood clotting	Delayed blood clotting

Exercise

- Tocopherol is the chemical name of
 - vitamin-B
 - vitamin-E
 - vitamin-C
 - None of these
- Calciferol is the chemical name of
 - vitamin-D
 - vitamin-A
 - vitamin-C
 - vitamin-B
- Water soluble vitamins are
 - vitamin-A, D
 - vitamin-E, K
 - vitamin-B, C
 - None of these
- Which substance is known as building block?
 - Water
 - Fat
 - Carbohydrate
 - Proteins
- Osteomalacia is caused due to deficiency of
 - vitamin-A
 - vitamin-B₁₂
 - vitamin-D
 - None of these
- Pernicious anaemia is caused due to
 - vitamin-B₁
 - vitamin-B₂
 - vitamin-B₄
 - vitamin-B₁₂
- Obesity is caused due to
 - excessive intake of food
 - deficiency of food
 - Both (a) and (b)
 - None of these
- Xerophthalmia is caused due to deficiency of
 - vitamin-D
 - vitamin-A
 - vitamin-C
 - vitamin-K
- The essential fatty acid in the diet is
 - linoleic
 - stearic
 - oleic
 - palmitic
- A good source of vitamins of B group is
 - carrot
 - fish oil
 - germinated seeds
 - egg yolk
- Deficiency of vitamin-C causes
 - anaemia
 - rickets
 - scurvy
 - xerophthalmia
- Prolonged deficiency of nicotinic acid in human diet may lead do
 - beri-beri
 - pellagra
 - scurvy
 - rickets
- Recently discovered vitamin having anti-cancer properties is
 - Vit-B₅
 - Vit-B₁₅
 - Vit-B₁₇
 - Vit-Q

14. Vitamin containing a cobalt cyanide linkage is
(a) A (b) B₁
(c) B₆ (d) B₁₂
15. Which is the best source for vitamin B₁?
(a) Cod liver oil
(b) Egg
(c) Whole wheat bread
(d) Curd
16. Which of the following is not a digestive gland that is associated with the alimentary canal?
(a) Salivary gland (b) Liver
(c) Pancreas (d) None of these
17. Carbohydrates includes sugar and
(a) nucleic acid (b) nucleotides
(c) glycogen (d) starch
18. Which nutrients are solid at room temperature?
(a) Oils (b) Fats
(c) Both (a) and (b) (d) None of these
19. Nutrients, which are used mainly for growth and repair are
(a) carbohydrates (b) lipids
(c) proteins (d) None of these
20. Proteins are made up of carbon, hydrogen and
(a) water (b) oxygen
(c) amino acids (d) None of these
21. Daily requirement of proteins is
(a) 10-20 g (b) 50-60 g
(c) 70-100 g (d) 100-120 g
22. Phylloquinone is the chemical name of
(a) vitamin-E (b) vitamin-K
(c) vitamin-B₅ (d) vitamin-B₁₂
23. Fruits and vegetables are principal source of
(a) vitamin-A (b) vitamin-B
(c) vitamin-C (d) vitamin-D
24. What is the common source of vitamin-B₁₂?
(a) Green vegetables (b) Peanuts
(c) Cereals (d) Eggs
25. A component of vitamin-B₁₂ is
(a) cobalt (b) magnesium
(c) calcium (d) sodium
26. A mineral, which needed more in girls as compare to boys, is
(a) sodium (b) calcium
(c) iron (d) magnesium
27. Whole grains are important sources of
(a) niacin (b) calciferol
(c) thiamine (d) Both (a) and (c)
28. This vitamin is present in natural foods in very small amount. The vitamin is
(a) A (b) B (c) C (d) D
29. The raw materials needed for the construction of body tissues are
(a) carbohydrates (b) proteins
(c) minerals (d) None of these
30. A component essential for enzyme, melanin and haemoglobin formation is
(a) iron (b) zinc
(c) iodine (d) copper
31. The body needs iodine for the production of
(a) melanin (b) thyroxin
(c) haemoglobin (d) None of these
32. The vitamin, which is essential for the formation of collagen and intercellular cement, is
(a) B₁₂ (b) B₅
(c) C (d) D
33. Cheilosis is caused due to the deficiency of
(a) vitamin-B₂ (b) vitamin-B₃
(c) vitamin-B₁₂ (d) vitamin-B₅
34. The term 'vitamin' was coined by
(a) Edward Jenner (b) R. Mishra
(c) C. Funk (d) Lunin
35. The fibrous matter present in the food is
(a) vitamins (b) minerals
(c) roughage (d) carbohydrates
36. A component, which helps in digestion, transportation and excretion, is
(a) vitamins (b) minerals
(c) roughage (d) water
37. Vitamins are essential in metabolism because they
(a) serve as structural components
(b) serve as sources of energy
(c) act as coenzymes
(d) cannot be stored in the body
38. Reduced growth, hair loss and vomiting may result from a deficiency of
(a) iron (b) copper
(c) potassium (d) zinc
39. Obstruction of the common bile duct by gall stones would most likely affect the digestion of
(a) carbohydrates (b) fats
(c) proteins (d) nucleic acids
40. Amylase in saliva initiates digestion of
(a) lipids (b) proteins
(c) carbohydrates (d) fats

Answers

1. (b) 2. (a) 3. (c) 4. (d) 5. (c) 6. (d) 7. (a) 8. (b) 9. (a) 10. (c)
11. (c) 12. (b) 13. (c) 14. (d) 15. (c) 16. (d) 17. (d) 18. (b) 19. (c) 20. (b)
21. (c) 22. (b) 23. (c) 24. (d) 25. (a) 26. (c) 27. (d) 28. (d) 29. (c) 30. (d)
31. (c) 32. (c) 33. (a) 34. (c) 35. (c) 36. (d) 37. (c) 38. (d) 39. (b) 40. (c)