

Carbohydrates

1. How are carbohydrates classified?

Ans – Based on the number of saccharide units present, carbohydrates are classified into mono, di and polysaccharides.

2. What do you mean by simple and complex sugars?

Ans - Simple sugars are those which get easily digested in our body and absorbed, and complex sugars are those which take time for digestion and absorption. The chemical structure is also simpler in case of simple sugars. The simple sugars include monosaccharides disaccharides and oligosaccharides.

3. What are complex sugars

Ans - Complex Sugars are polysaccharides like starch, fibre and Dextrin. They consist of several monosaccharide units.

4. Name some nutritionally important monosaccharides.

Ans – They are:

- Glucose - It is a primary source of energy in the human body. It is also known as dextrose. It occurs in free state in many fruits. Whatever we eat finally gets metabolized and converted into glucose.
- Fructose - It is the sweetest natural sugar that is found in fruits and honey.
- Galactose it does not occur free in nature. It is present along with glucose in lactose.

5. Name some nutritionally important disaccharides.

Ans – Some of the nutritionally important disaccharides include:

- Sucrose – It is obtained from sugarcane and sugar beet. It is commonly known as table sugar or refined sugar. It is formed by condensation of one molecule of glucose and one molecule of fructose by the elimination of water molecule.
- Maltose - It contains 2 glucose units. It is present in malt. It is formed in cereal grains like Barley, Jowar and Ragi during germination.
- Lactose is formed by condensation of glucose and galactose. It is present in milk of mammals. It has not been found in plant products.

6. Name some nutritionally important polysaccharides.

Ans - They are starch, glycogen and dextrin.

Starch- It is a white tasteless powder which forms a paste when boiled. It is a polysaccharide formed by condensation of large number of glucose molecules. Starch is a very important carbohydrate in human diet. It is a storage form of carbohydrate in plants. Rich sources of starch include millets, rice, wheat, etc. (contain 70% of starch). Roots like potato, tapioca also contain considerable amount of starch.

Glycogen - It is an animal starch. It is a storage form of polysaccharide in case of animals. It is formed by condensation of large number of glucose molecules.

Dextrins - They are the easily digestible forms of polysaccharides. They are formed by the partial breakdown of starch into smaller units in our body. They are intermediate products in the hydrolysis of starch. They are abundant in germinating seeds.

7. What does dietary fibre consist of?

Ans – It mainly consists of complex polysaccharides. Dietary fibre can be of two types: soluble and insoluble fibre. Soluble fibre includes pectin and gums; and insoluble fibre includes cellulose and hemicellulose.

8. What is the nature of cellulose?

Ans – It is a polysaccharide which is made up of a number of glucose units. Its chemical structure is different from that of starch with respect to the mode of linkages between glucose molecules. Cellulose is mainly present in plants. It can be digested by animals, but not by humans. It acts as a roughage in the intestinal tract.

9. Where can you find the polysaccharide hemicellulose?

Ans – Hemicellulose is present in small amounts in all vegetables and large amounts in corn cobs, green grains and straws. They are acted upon by bacteria present in the largest intestines.

10. What are the functions of carbohydrates?

Ans – The functions are:

- Acts as a source of energy.
- Acts as energy reserve.
- Protein sparing function
- Oxidation of fats
- Adds roughage
- Helps in the synthesis of carbon skeleton of essential amino acids
- Prevents degradation of skeletal muscles and other tissues

11. What are the two types of enzymes that are mainly involved in the digestion of Carbohydrates?

Ans – The enzymes are amylases and disaccharidases.

12. Describe the digestion of carbohydrates in mouth.

Ans – The digestion of Carbohydrates starts in mouth when food comes in contact with saliva during mastication. Saliva contains carbohydrates-splitting enzyme called salivary amylase which is also known as ptyalin. This enzyme triggers the conversion of glycogen, starch and dextrins into a disaccharide maltose.

13. Describe the digestion process in stomach.

There is no enzyme to break glycosidic bonds of carbohydrates in gastric juice. In the presence of HCl, the hydrolysis of sucrose is enhanced.

Sucrose $\xrightarrow{\text{HCl}}$ Fructose + Glucose

14. Describe the process of digestion of carbohydrates in small intestines.

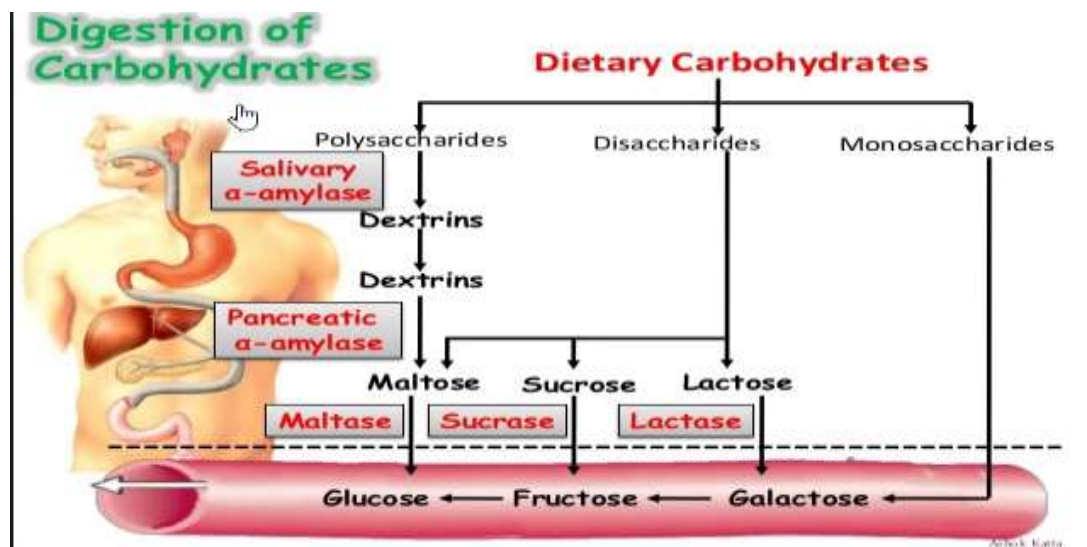
Ans – In the duodenum of small intestine, the food bolus meets pancreatic juice containing the enzyme pancreatic amylase. This is the main enzyme which is involved in the digestion of carbohydrates. Pancreatic amylase converts starch and glycogen into maltose and isomaltose, Dextrins and oligosaccharides

15. Where are the disaccharidases present?

Ans – They are present in the brush border epithelium of intestinal mucosa. Some of the disaccharidases are: Maltase, Sucrase

16. How are the digested products of carbohydrates absorbed?

Ans – The absorption of monosaccharides, that is, the final products of digestion, takes place either through diffusion or active transport. This absorption takes place through the villi present in the small intestines.



17. What are the symptoms of the deficiency of carbohydrates?

Ans – Hypoglycaemia is marked by low blood sugar levels. This condition arises when the carbohydrate intake is low. The glucose levels drop in the blood. This condition is usually seen in diabetics but it may also happen due to lack of carbohydrates in diet.

Symptoms include: tiredness, weakness, confusion, hunger, light-headedness

18. Name some common sugar tests performed to assess the sugar levels.

Ans – The tests are:

- Fasting blood sugar test
- Postprandial blood sugar test
- Glucose tolerance test
- Random blood sugar test

19. What are the causes and symptoms of secondary undernutrition of carbohydrates?

Ans – Secondary undernutrition of carbohydrates is mainly caused when:

- There is a failure of absorption of carbohydrates
- Increase in nutritional requirement which is not met through diet
- Diarrhoea

Some of the clinical symptoms of this problem are: feeling tired all the time, taking long time to recover from infection, delayed wound healing, depression, irritability and poor concentration. This problem is diagnosed by

- Comparison of patient' weight to standardised charts
- Physical observation
- Calculation of BMI

Treatment of secondary nutrition involves providing supplements of carbohydrates and providing health education.

20. What are the problems that arise due to over consumption of carbohydrates?

Ans – The problems are:

- Dental caries and tooth decay
- depresses appetite and provides hollow calories resulting in malnutrition
- high intake of sugar and refined carbohydrates increases triglyceride levels leading to heart diseases
- excess of fibre also causes accumulation of gas and bloating overweight