

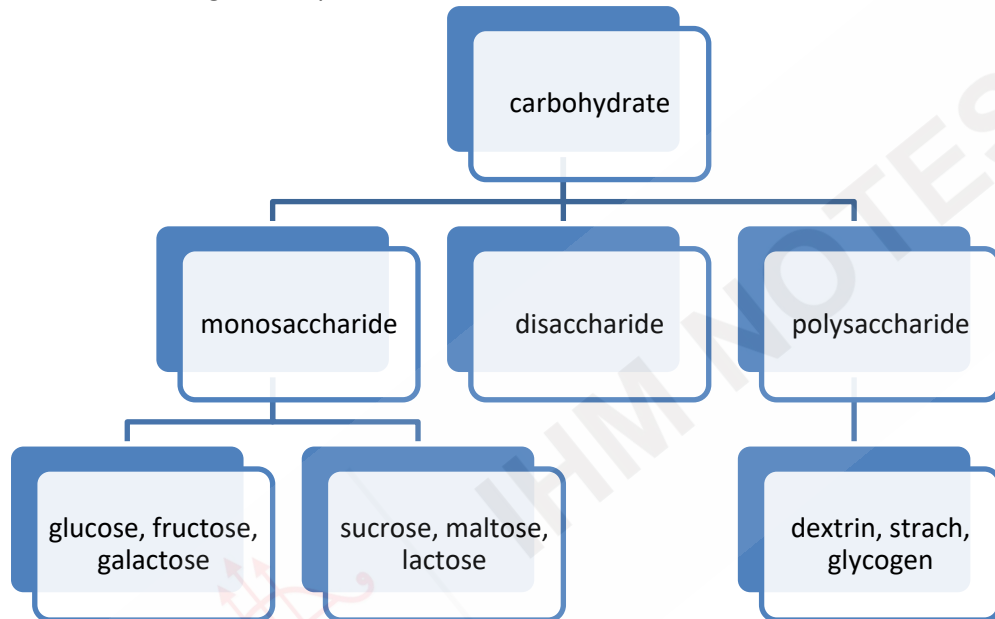
UNIT -3 CARBOHYDRATES

They are the major source of energy in ones diet. They are mainly present in food in form of sugars starches & fibre. Carbohydrates are polyhydroxy aldehydes or ketones They are organic compounds of carbon ,hydrogen and oxygen.

Classification

Carbohydrates can be classified...

A) on the basic of no of sugar units present



MONOSACCHARIDES are the simplest form of CHO found in nature. These simple sugars are made up of a six carbon chain or ring to which hydrogen and hydroxyk groups are attached. The general formula is $C_6H_{12}O_6$. They differ from one another because of their arrangement of different atoms around the carbon chain and because of this they have different properties and vary in their degree of sweetness.

Glucose-

- it is the most important CHO used by the body.
- It is absorbed into the blood steam after CHO is digested in the body. It is also known as dextrose. Available in powder and liquid form. It is found in varying amounts in fruits and vegetables. Found in large amount in fruits like grapes, smaller amount in vegetables like peas.

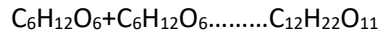
Fructose-

- It is sweetest of all sugars, is also known as fruit sugar and levulose.
- In human body it is converted to glucose and oxidized as a source of energy.

Galactose-

- It is not present in food as such, but produced when lactose a disaccharide is broken down during digestion.

DISSACHARIDES are double sugars composed of two monosaccharides linked together with the removal of a water molecule. These sugars have a general formula $C_{12}H_{22}O_{11}$



Sucrose-

- It is table sugar
- It is produced in plants by the condensation of glucose and fructose.
- It is found in many fruits and vegetables like sugarcane and sugar beet contain relatively large quantities.
- It is from cane and beet that sugar is extracted commercially.

Lactose-

- It is milk sugar
- Made up of one unit of glucose and one unit of galactose.
- It is least sweet of all sugars and easily fermented to lactic acid by lactic acid bacteria while preparing curd and cheese.

Maltose-

- It is made up of two units of glucose.
- During the germination of whole grains starch is broken down into maltose
- In the body maltose is formed during digestion of starch.

POLYSACCHARIDES are complex carbohydrates made up of 100-2000 glucose units linked to each other in chain or branched form. The number of glucose units, their arrangement and linkage to one another influence the properties of the polysaccharides.

Dextrins-

- They are smallest and simplest of all polysaccharides.
- They are composed of glucose units linked by α 1,4 glucosidic linkage.
- They are formed by dry heating or acid hydrolysis of starch.
- They are slightly soluble have a mild sweet taste and limited thickening ability.

Starch-

- It is found in most parts of the plant as a reserve store of carbohydrate.
- It is usually present in the seed and root in large amounts.
- Starch consists of long chains of glucose units present in two forms amylose and amylopectin.

B) On the basis of availability to the body

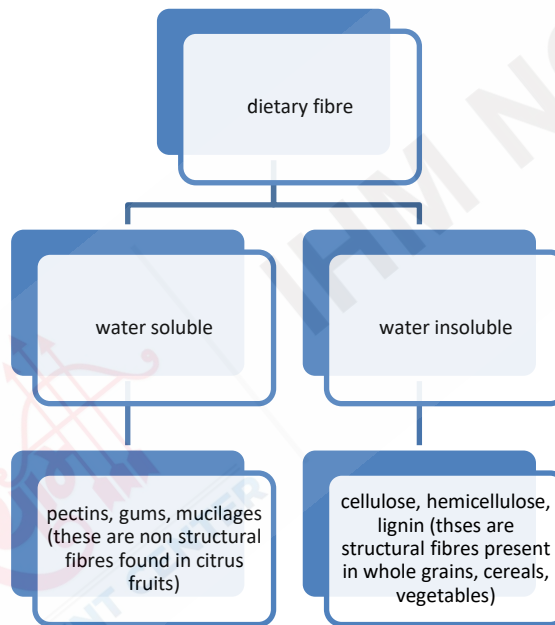
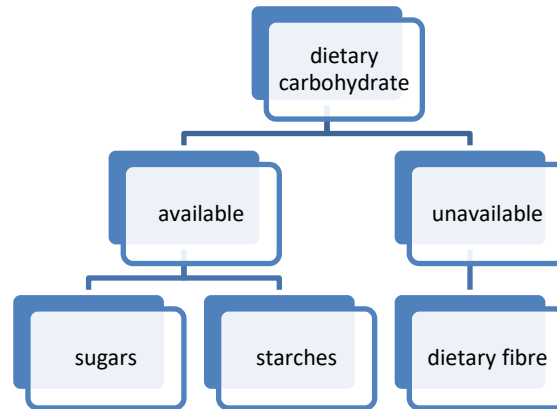
Available- carbohydrates: carbohydrates which can be digested in the human body and yield energy on their oxidation in the body eg. Sugars & starches.

Unavailable carbohydrates: Carbohydrates which cannot be digested by our body due to unavailability of the enzyme necessary for its breakdown. These unavailable carbohydrates does not provide energy to the body, but are important for maintaining waste elimination from body. eg. Cellulose, Hemicellulose, pectins .

Sources of carbohydrates

- Cereals –wheat, rice, jowar, (sorghum) bajra, ragi, oats, barley, (jau) corn
- Pulses- All whole grain and dehusked pulses rajmah, bengal gram, lentil etc
- Fruits & vegs- Mango, chikoo, banana, potato, yam (zimikand), colocasia

- Nuts and oilseeds- Cashewnuts , groundnuts coconut (dry)
- Miscellaneous- Sugar , jaggery , honey, sago, tapioca



Of our daily diet energy 50-70% of energy should come from carbohydrates.

Important sources of carbohydrates in the diets of Indians are cereals, millets, roots , tubes , pulses, sugar & jiggery

Fibre- 40 grams/day is desirable.

FUNCTIONS OF CABBOHYDRATES

1. The most important function of carbohydrate is to provide energy to the body. CHos provide 4 kcal/g of energy .It the cheapest source of energy available .
2. Glucose is the only from of energy used by the central nervous system.
3. They have a protein –sparing action ie it spares protein from being broken down for energy and can be used for its major function of body build and repair.

4. They are required for complete oxidation of fat In CHO deficiency fats are broken down rapidly and ketones are formed in large amount resulting in a condition called ketosis
5. Sugar lactose helps in absorption of minerals calcium and phosphorous.
6. Lactose helps in growth of certain bacteria in the intestine this bacterial floes is capable of synthesizing B-complex vitamins in gut especially Vit B 12
7. Dietary fiber plays an important role in increasing fecal matter by absorbing and holding water, stimulation peristalsis and eliminating fecal waste.
8. Fibre also helps in lowering blood cholesterol levels by binding bile acids and cholesterol.

SIGNIFICANCE OF DIETARY FIBRE

1. Dietary fibre does not provide energy on consumption but provide bulk to the diet , thus they are unavailable polysaccharides. It is the total amount of naturally occurring material in plant, which is not digested by human body.
2. Fibre can absorb and hold water thereby increases faecal bulk.
3. This acts as laxative and reduces intraluminal pressure in the colon preventing diverticulosis.
4. Prevents constipation by stimulating peristalsis in the large intestine.
5. Fibre stimulates contraction of muscular walls of the digestive tract.
6. Soluble fibre binds bile acids and cholesterol, thus beneficial for people suffering from coronary heart disease.
7. Fibre reduces the triglyceride and cholesterol level in blood.
8. It is beneficial for people who are on weight reduction regime, as it provides satiety.
9. Helps in lowering blood sugar levels in diabetics by slowing down carbohydrate absorption and lowers insulin requirement.
10. Regular intake of fibre may prevent cancers of colon and rectum.

Hormonal control

Insulin lowers blood glucose levels by getting it utilized.

Glucagon causes rise in amount of sugar in blood.

In deficiency of insulin hormone blood glucose level increases which can lead to condition called DIABETES.

EXCESSIVE CONSUMPTION of carbohydrates lead to dental caries, increase in triglyceride levels, fibre leads to irritation, interfere with absorption of vitamins and minerals.

DEFICIENCY of carbohydrates leads to incomplete oxidation of fat which results into accumulation of ketone bodies.