IQRA NATIONAL UNIVERSITY

DEPARTMENT OF ALLIED HEALTH SCIENCES

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COURSE TITLE:

Macronutrients in Human Nutrition

COURSE INSTRUCTOR:

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DEPARTMENT:

Human Nutrition and Dietetics

QUESTION NO. 1:

QUESTION:

What are Carbohydrates? What is their role in our body?

ANSWER:

CARBOHYDRATES:

Carbs are naturally occurring organic compounds. They are one of the major macro nutrients that are important for a normal functioning of the human body. They are made up of carbon, hydrogen and oxygen. The carbs are the most abundant and cheapest source of energy. The main function of carbs is providing energy to the body.

DEFINITION:

"They are the Polyhydroxy of Aldehyde and Ketone."

CHEMICAL FORMULA:

The chemical formula of carbs is **C6 H12 O6**.

IMPORTANCE OF CARBOHYDRATES IN THE HUMAN BODY:

Carbohydrates are produced in green plants from carbon dioxide and water during the process of photosynthesis. Carbs play an important role in the normal functioning of the human body as it provides the maximum energy to perform the metabolic and other chemical functions of the body.

CLASSIFICATIONS OF CARBOHYDRATES:

The carbs are classified into the following;

- Monosaccharides
- Disaccharides
- Oligosaccharides
- Polysaccharides

MONOSACCHARIDES:

They are the simplest sugars; they are made up from one unit. They are found in grapes, honey and some other fruits. There are three main simple sugars (Glucose, also known as grape sugar or corn sugar, Fructose, also known as fruit sugar and Galactose) they are isomers of each other.

DISACCHARIDES:

They are double sugars as in they are made up of two or more monosaccharides units. They are also called (Table sugar) The sucrose is a disaccharide, the common example is the lactose and maltose.

OLIGOSACCHARIDES:

They are made up of three to six monosaccharides, examples are raw sugar, brown sugar, vegetables, honey and refined sugar.

POLYSACCHARIDES:

The word poly means ‘many’ it represents most of the structural and energy reserve carbs found in nature. It may contain as many as 10,000 monosaccharides units linked together. Examples are starch, glycogen and cellulose.

BIOLOGICAL IMPORTANCE OF CARBOHYDRATES IN THE HUMAN:

The importance of carbs in the living things is very important, it is the major source of energy for both plants and animals and it is the cheapest source of energy for them. Carbs are the fastest way to get energy and they are not stored in the body for a long time as of Lipids which are stored for a long time in the body. They also help in the regulation of blood glucose level. Helps in the prevention of degradation of skeletal muscles and other tissues like heart, liver, kidney. Also prevents the breakdown of proteins for energy. Carbs forms a part of genetic material like DNA and RNA in the form of deoxyribose and ribose sugar. They help in making the body mass by being included in all the parts of the cells and tissues. Adequate storage of hepatic glycogen helps in detoxifying a normal liver. Carbs forms certain type of bio –molecules which helps in the blood clotting, immunity, fertilization etc. They provide bulk fiber for proper digestion. Carbs provides sweetness to the food. Pectin and hemicellulose forms the structural plant cell wall while the cell wall of fungi and the outer schelitone of insects are made up of chitin. Bacteria cell wall is made up of Murine. As we know that carbs are one of the main macro nutrients and its main function is providing energy to all the living things so it has many functions that play significant role in the human body.

SIMPLE AND COMPLEX CARBOHYDRATES:

SIMPLE CARBOHYDRATES;

These are simple sugars, they consist only one or two molecules, they give instant energy and then the body feels hungry again. The example are white bread, sugars and candies.

COMPLEX CARBOHYDRATES;

They are long chains of carb molecules, they are can keep you full for a long time and are consider more healthier than the simple sugars as they contain vitamins, minerals, fibers and wholegrains. They are fruits, vegetables, pulses and whole meal pasta.

QUESTION NO. 2:

QUESTION:

What are the impacts of deficit and excess of intake of Carbohydrates?

ANSWER:

CARBOHYDRATES:

As we know that carbs are the polyhydroxy of aldehyde and ketone. As they are the main source of energy for the body and also helps in some other metabolic and chemical functions. It is important to take the right amount of carbs because they give 55% of energy to the body, if the amount of carbs decreases then it may cause deficiencies in the body and may cause serious diseases in the body.

DEFICIENCIES OF CARBOHYDRATES IN THE BODY:

There are many diseases caused in the body due to the improper intake of carbs. Some of them are given below;

1. **ACIDOSIS**
2. **KETOSIS**
3. **HYPOGLYCEMIA**
4. **CONSTIPATION**
5. **IMPROPER FUNCTION OF THE BRAIN**
6. **PROTEIN EATING**

1. ACIDOSIS:

When the body faces the deficiency of carbs there is a shift from the breakdown of glucose to the breakdown of lipids and there is energy needed for the ketogenesis the product form ketoacids increases the acidity in the blood and the body's other tissues .Due to these changes the arterial blood outside 7.35 pH - 7.45 pH, results in irreversible cell damage.

2. KETOSIS:

In carb deficiency the acetyl-CoA which is found in the liver where it is used to produce to form ketone bodies produced from the breakdown of fatty acids and determination of amino acids leads to the state of ketosis.

3. HYPOGLYCEMIA:

Due to less intake of carbs due to which the glucose is not available which causes a drop in the blood glucose level and this happens when the blood glucose level drops to 70 mg/dl. With its symptoms like giddiness, fatigue, distress and delirium.

4. CONSTIPATION:

As carbs are good dietary fibers (essential) and when its deficiency occurs it causes problems in digestion and cause constipation. It also prevents recto-colon cancer and helps digestion.

5. IMPROPER FUNCTION OF THE BRAIN:

The brain is the most important organ of the living things and its responsible for all the functions and occurrence of different reactions in the body and the proper blood supply and nutrients for the brain is very important. The brain gets energy in the form of glucose only and when the lack of carbs occurs in the body the production of glucose decreases and the energy supply to the brain also decreases, so the brain stops working properly.

6. PROTEIN EATING:

As carbs also helps in the making of the body mass because it’s also present in all the cells and tissues. So, when the supply of carbs stops, the energy supply to the body also stops, so the body starts to eat the proteins of the body to get energy and this causes many diseases.

COMMON SYMPTOMS:

- Nausea
- Vomiting
- Dizziness
- Constipation
- Weakness
- Bad Breath
- Loss of Appetite

EXCESSIVE INTAKE OF CARBOHYDRATES AND ITS EFFECT ON THE BODY:

The excessive intake of carbs will ultimately start to produce more insulin because the blood sugar rises and the glucose starts to get stored in the form of fats. Which causes the body to get fat and if one is already carrying a few pounds then it may lead to diabetes, obesity, heart diseases, nervous system diseases, digestion problems etc.

1. DOUBLE SECRITION OF INSULIN:

When one eats more Carbs than that is required for them, then the body starts secreting insulin twice. The digestive system breaks the glucose, and that is released in to the blood which rises the blood sugar level, due to this the production of glucagon stops which is needed for the breakdown of glucose, thus the double secretion of insulin occurs and more glucose gets stored in the form glycogen.

2. OVER WEIGHT:

As we know that carbs are the main source of energy and it also helps in performing different functions so when a person starts to eat carbs daily more than the amount that is required for them, the body starts the excess carbs deposition in the body as fats and they are stored for a long time .This action causes

the body to store the carbs without using it and this causes increase in the body weighty. But if a person is already carrying some fats or are overweight then they can reach to the level of obesity.

3. DIABETES:

Diabetes is caused by the immune system when it kills the beta cells of the pancreas which produces insulin which is used to absorb the sugar from the blood stream and make the blood sugar level normal. When the beta cells get destroyed and that causes the insulin production to slow down or stop, this causes diabetes in a person. It may be caused due to excessive intake of carbs or some other bacteria or viral infection that may trigger it to happen.

4. HEART DISEASES:

The heart diseases also called the (Cardiovascular Disease) is one of the most common cause of excessive intake of carbs and one of the most dangerous ones. Excessive carbs rise the blood glucose and insulin level which increases the level of fatty substances called Triglycerides. The triglycerides increase the blood, and lowers the levels of good cholesterol, and may cause a heart attack. It is caused when a person starts to eat food that is high in carbs, fats and oils. What happens is that when the food is digested in the stomach. The glucose and the fats that are needed by the body are used and the remaining is stored in the body. This leads to increase in the body weight and it also starts to get deposit on the walls of the artery which produces pressure, due to which the heart doesn't get enough blood and oxygen so the person can get a stroke or even worse a heart attack.

5. NERVOUS SYSTEM DISEASES:

It is also one of the common and serious disease of excessive carb intake followed by Cardiovascular diseases. It is also caused with (diabetic ketoacidosis, hyperosmolar coma and hyperglycemia). So when the carbs and fats intake rises in the body the risk of this disease also rises because the excess fats get deposits on the inner walls of the artery and veins which stops the blood supply, oxygen, nutrients and other important chemicals that are needed for the proper function of the nervous system and it may lead to brain damage, stroke or bursting of an artery or vein.

QUESTION NO. 3:

QUESTION:

What are Carbohydrates? What is their role in our body?

ANSWER:

PROTEINS:

The word protein comes from the Greek language (Proteios) which means (primary or of prime importance) means that proteins holds a very essential place and are very important. Proteins are one of the most important macro nutrients that is very important for the living thing. They are organic compounds that are made up from carbon, hydrogen, oxygen, nitrogen and sometimes sulfur. Proteins are made up of 20 different types of amino acids. The amino acids are linked together in long chains and are folded up in a complex way, due to which the proteins get their unique shape.

DEFINITION:

"Organic Compounds that contain
Nitrogen as well as
Carbon, Hydrogen, and Oxygen."

IMPORTANCE OF PROTEINS:

The proteins are of great importance for the human body. They are large molecules that play an important and complex role like it helps in the repair of damaged tissues, building of body mass, helps in various metabolic reactions, formation of bone, cells, frame work, balance of proper body fluids and PH.

IMPORTANT FUNTIONS OF PROTEINS IN THE HUMAN BODY:

There are many important functions of proteins in the body that are essential for the human body, which are as follows;

1. GROWTH AND BUILDING OF BODY MASS:

As we know that our body cells are made up of proteins and they also help in the repair of damage tissues and cell. Like the body is in a continuous phase of breakdown of proteins, as in every three day the cells and tissues are broken down and are replaced with the new ones. The new cells arise from the preexisting cells. The human skeleton is also made from proteins, so the proteins also build up the muscles, bones, cells, tissues, organs etc. Thus, the proteins are very important for growth.

2. DIGESTIVE ENZYME:

Protein as digestive enzymes is essential for the normal digestion of food. The enzymes like amylase, lipase, pepsin, trypsin. Theses enzymes helps in digestion by breaking down the larger and complex molecules into smaller and simpler molecules by catabolizing nutrients in to monomeric units.

3. TRANSPORTATION:

Protein helps in the transport of different type of nutrients, signals and different chemical substances to different parts of the body. The transport proteins like (hemoglobin and albumin), helps in the transport of essential nutrients to all over the body and sending signals to the body.

4. AS A STRUCTURAL PROTEIN:

As we know that the body is made up of protein, so one of its important functions is as a structural protein as it makes different types of structures in the body i.e. hair, nails, skin, horns, hoofs, cytoskeleton, cells, tissues, organs, skeleton etc. The structural proteins are (Actin, Tubulin, keratin etc.).

5. PROTEINS AS HORMONES:

The proteins as hormones are very important for the normal function of the body, the hormone like insulin which helps in the regulation and balancing the blood sugar level of the body. The hormone thyroxin which is produced in the thyroid gland and it is used in the coordination of different activities of the body, increases the rate of the metabolic reaction rate and it also helps in the regulation of the growth and development.

6. IMMUNITY:

Proteins helps the body's defense system which is called the immune system. Like immunoglobulins they help in the defense and protection of the body from the pathogens. Their function is as antibodies which kill the harmful bacteria, virus, and other dangerous pathogens. They are glycoproteins which are produced by the white blood cells (plasma cells), they have a specific ability like memory through which they recognize the pathogen and kill them on site.

7. CONTRACTILE PROTEIN:

The contractile proteins help in the contraction of the muscles attached to the bones of the skeleton. The tropomyosin are the contractile proteins which help in the contraction on the muscles and non-muscle cells and are also present in the animal cells, this contraction is done by (tropomyosin, actin myosin).

8. AS A STORAGE PROTEIN:

They are very important because as proteins are made up of amino acids and they are important for the growth and maintenance, they also are reserves of metal ions and amino acids. They can be found in green plants, egg white (albumin), milk etc. The legume storage proteins help in the nourishment and maintenance of the early development of an embryo and seedling.

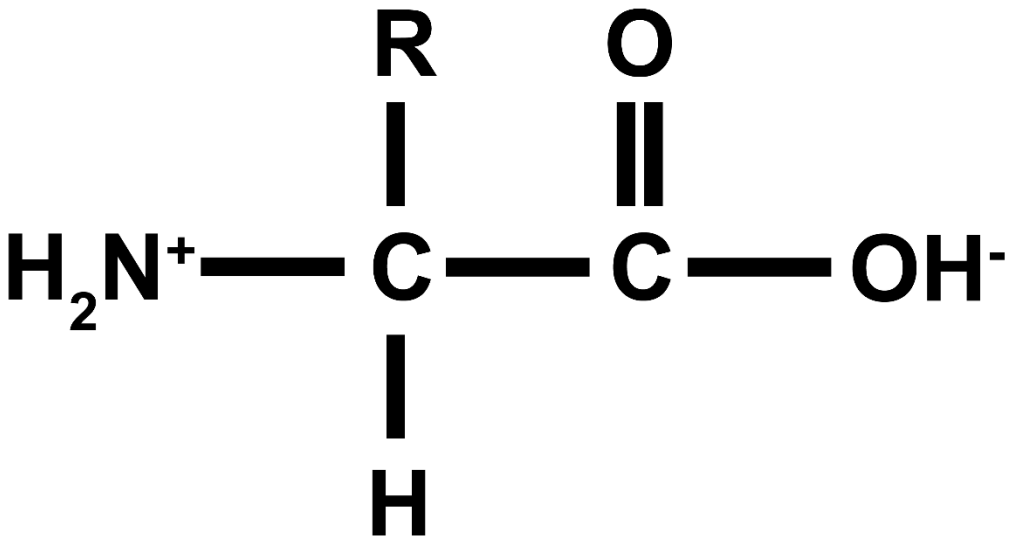
9. PROTEIN IN DNA:

As we know that the proteins are also present in the heredity material called the DNA which is very important for the transfer of genetic material from parents to their off springs. There is a protein in the DNA called the histone protein which helps in the formation of the unique shape of the DNA. Some other proteins

called the messenger proteins which transmits the signals from one part of the body to the other.

STRUCTURE OF AMINO ACID (PROTEIN):

The protein structure is made up of amino acids which are the building blocks of proteins. The amino acid is linked together by Peptide bond or Poly peptide bond. It consists of a Carboxylic group (COOH), a Hydrogen group (H), an Amino group (NH2) and a variable group (R group) these groups are attached to one Alpha Carbon at the center. Below is the diagram of the structure;



Structure of Amino Acid (Protein)