Importance of Protein in daily diet

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The term protein is coined by Dutch chemist Mulder in 1938. He defined protein as nitrogen containing constituent of food and life is impossible without it. Aminoacids unite to form the complex molecule of proteins. Protein constitutes about 1/5 th of an adult body weight and is the base material of life. In human body protein is present in 50% muscle, 20% in bone, 10% in skin and rest in other parts of the body. At present all are conscious about their body built and for meeting daily requirement of protein many of them depends on protein mixtures. So here is an information on functions, sources and requirements of protein. So that natural sources of proteins can be utilized at its best.

Functions of protein:

- Proteins are necessary for growth and maintenance
- Required for replacement of wear & tear of body
- Essential for metabolic processes, synthesis of blood proteins and digestive enzymes
- Necessary for synthesis of hormones and antibodies
- Proteins are necessary for transporting substances in the body.

  Ex.: oxygen is carried by hemoglobin
- Proteins help to maintain the body fluid and electrolyte balance

Classification of proteins

I. Based on chemical composition:

Simple protein: The protein which yields only amino acids or their derivatives on hydrolysis.

Ex.: Albumins, globulins, glutelins, histones , prolamins

Conjugated proteins: The protein which contains a non protein group known as prosthetic group

a. Nucleoprotein: protein combined with nucleic acid

Ex.: chromosomes, nucleoli

b. **Glycoprotein:** Protein molecule combined with a carbohydrate group

Ex.: Serum globulins, mucin

c. Phosphoproteins: Protein which contain phosphoric acid

Ex: Casein of milk

d. Heamoglobins: Protein molecule combined with heam

Ex: Haemoglobin of blood

e. Mucoproteins: Protein molecule combined with mucopolysaccharides

Ex: Glycoid of serum alpha globulin

f. Derived proteins: are the derivatives of protein molecule formed through hydrolytic changes obtained by the action of acids, alkali or enzymes on proteins.

Ex: Metaproteins, peptones, polypeptides, proteases

II. Nutritional classification of proteins:

Proteins are classified depending on quality

1. Complete proteins: Proteins containing all the essential amino acids required for growth.

Ex: egg, milk

2. Partially complete proteins: Proteins partially lacking in one or more essential amino acids which promote moderate growth.

Ex: Wheat proteins, glutenin

3. Incomplete protein: Proteins completely lacking in one or more essential amino acids and which do not promote growth.

Ex: maize lacking in tryptophan

Properties of protein:

1.They are amphoteric in nature i.e. they act as both acids and bases

2. Solubility: Each protein has a definite characteristic solubility in a solution of known salt concentration &pH. Albumin is soluble in water, Casein in alkaline pH and Globulin is soluble in neutral NaCl solution

3.Some proteins have colloidal nature of protein solution. These proteins have large molecular weights and protein solution is colloids. They cannot pass through semipermiable membranes.

Determination of protein quality:

Its quality depends on biological value, Net Protein Utilization (NPU).

Biological Value (BV): It determines the percentage of absorbed nitrogen from dietary protein actually retained by the body, measured under standard conditions. The greater the proportion of N retained, the higher is the BV or quality of protein. Eg: Eggs have BV of 87-97, Cow's milk-85-90, Rice and Tofu -75. Animal protein has more BV compared to Plant protein

Net Protein Utilization (NPU): It is an index that takes into account the relative digestibility of proteins. Even the best mixture of amino acids will be less available for use in the body if it is packed in a protein that is only partially digested. Most proteins are 90 percent or more digestible. So in most cases NPU approximates the BV

Table 1: Recommended Dietary Allowance (RDA) for Indians

Group	Particulars	Body Wt.(kg)	Net Energy (kcal/d)	Protein (g/d)	Visible fat (g/d)
Man	sedentary work	60	2320	60	25
	moderate work		2730		30
	heavy work		3490		40
Woman	sedentary work	55	1900	55	20
	moderate work		2230		25
	heavy work		2850		30
	pregnant women		350	82.2	30
lactation 0-6m			600	77.9	30
lactation 6-12 m			520	70.2	30
Girls 13-15 years		46.6	2330	51.9	40
Boys 16-17 years		55.4	3020	61.5	50
Girls 16-17 years		52.1	2440	55.5	35

Source: ICMR

Sources of proteins:

Animal sources are complete proteins, such as meat, egg, fish and poultry . Milk is a valuable source of protein because although it does not contain a large quantity of protein, the quality is excellent. For vegetarians replace meat with legumes, seeds and nuts, use variety of legumes, fruits and vegetables. Ensure selection of nutritious foods, Eat dry fruits and exposure to sunlight will provide Vitamin D and supplement the diet with VitaminB12

Deficiency of proteins causes Kwashiorkar

Kwashiorkor is a severe form of protein malnutrition. Usually, infants and children are affected particularly children aged 1–3 years in regions with carbohydrate-rich and protein-deficient diets.

The clinical symptoms :

- Growth failure: Decreased body length and low body weight.
- Mental changes: Show no interest in surroundings
- Oedema: it occurs first in the feet and lower legs and then may involve hands, thighs and face.
- Muscle wasting: It is a constant feature of kwashiorkor and a reduction in the circumference of the upper arm usually evident.
- Moon face: the face is full well rounded.
- Liver changes: Liver is slightly enlarged and fatty infiltration of liver is usually present.
- Gastro intestinal tract: Loss of appetite and vomiting are common. Diarrhoea is present on most cases.
- Skin and hair changes: The characteristic skin changes of kwashiorkor are known as the ‘ Crazy pavement’ dermatitis. This is the most common on thighs. The lesions consist of dark hyper pigmented brownish black areas of skin.

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