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First of all nutrition is the science of food and the nutrients and other substances contained in food. It is the study of their actions, interactions and balance in relation to health and disease. Thus, nutrition is concerned with the digestion, absorption, transport, metabolism and functions performed by the essential nutrients.

Biological Value Of Protein

What i understand by biological value of protein is that it is the percentage of absorbed nitrogen retained by the body and is calculated by:

$$\text{Biological value (BV)} = \frac{\text{Nitrogen retained}}{\text{Nitrogen absorbed}} \times 100$$

The amount of nitrogen in the diet eaten and in excreta of adult animals are measured and the percentage of nitrogen retained by animals from out of nitrogen absorbed from the diet is calculated. The value thus obtained is the “biological value” (BV) of the protein.

- This test also gives an estimate of digestibility of the protein. But it cannot take into account the nitrogen that might be lost during the digestion process. The chemical score, BV, NPU, PER and deficient amino acids of some important food proteins is ;

NUTRITIONAL QUALITY OF PROTEINS

- In judging the adequacy of dietary proteins to meet the human needs, not only the quantity but the nutritional quality of the dietary proteins also matters.
- Proteins present in different foods vary in their nutritional quality because of the differences in their amino acid composition. The quality of protein depends on the pattern of essential amino acids it supplies.
- The best quality protein is the one which provides essential amino acid pattern very close to the pattern of the tissue proteins. Egg proteins, human milk protein, satisfy these criteria and are classified as high quality proteins and serve as reference protein for defining the quality of other proteins.

ASSESSMENT OF PROTEIN QUALITY

The quality of a protein is assessed by comparison to the “reference protein”, which is usually egg protein.

Four methods of assessment of protein quality are:

1. Chemical score or amino acid score
2. Net protein utilization (NPU)
3. Protein efficiency ratio (PER)
4. Biological value (BV).

Chemical score or amino acid score

It is a measure of the concentration of each essential amino acid in the test protein which is then compared with reference protein (usually egg protein). It is calculated by following formula:

$$\text{Amino acid score} = \frac{\text{Number of mg of one amino acid per gm of test protein}}{\text{Number of mg of the same amino acid per gm of egg protein}} \times 100$$

This mode of chemical assessment does not take into account the digestibility of dietary proteins.

Hence, biological methods based on growth or nitrogen(N) retention are used to determine the overall quality of a protein.

Net protein utilization (NPU)

- It is a product of digestibility coefficient and biological value divided by 100.
- Biological measures of NPU gives a more complete expression (both absorption and retention) of protein quality than the amino acid score as said above. It is calculated by the following formula:

NPU =

$$\frac{\text{Nitrogen retained by the body}}{\text{Nitrogen intake}} \times 100$$

- The protein requirement varies with the NPU of dietary protein. If the NPU is low, the protein requirement is high and vice versa.
- The NPU of the protein of Indian diets varies between 50 and 60.

Protein efficiency ratio (PER)

The overall quality, i.e. nutritive value of a food protein can be determined with laboratory animal like rat as follows.

The gain in weight of young animals per gm of protein consumed is measured and the value obtained is used to determine the protein efficiency ratio (PER) as follows:

Gain in body weight in gm

PER = -----

Protein ingested in gm

Biological value

Biological value of protein is defined as the percentage of absorbed nitrogen retained by the body and is calculated by:

$$\text{Biological value (BV)} = \frac{\text{Nitrogen retained}}{\text{Nitrogen absorbed}} \times 100$$

- The amount of nitrogen in the diet eaten and in excreta of adult animals are measured and the percentage of nitrogen retained by animals from out of nitrogen absorbed from the diet is calculated. The value thus obtained is the “biological value” (BV) of the protein.
- This test also gives an estimate of digestibility of the protein. But it cannot take into account the nitrogen that might be lost during the digestion process. The chemical score, BV, NPU, PER and deficient amino acids of some important food proteins.