



Good quality proteins and essential amino acids

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Obtain good quality proteins and essential amino acids (EAA) through appropriate combination of foods and avoid protein supplements to build muscle mass.

Rationale : *Maintaining good muscle mass is crucial for good health. Consuming good quality protein (that provides all the EAA) and following resistance exercise routine for greater muscle mass development and preservation.*

- Daily diet of an adult often provides 60g to 70g of protein a day, which is higher than what we require.
- However, quality of protein and meeting requirements of all essential amino acids (EAA) is the primary challenge.
- Of the twenty amino acids (AA) that are required for all the functions in the body, nine are essential; which cannot be synthesized in our body. Hence, it is important to consume diverse groups of foods to obtain all the essential nine AA
- Of the nine, four amino acids are the ones which are limiting in plant foods (vegetarian).
- Cereals have lower levels of lysine and higher levels of sulphur-containing amino acids (methionine and cysteine). The reverse is true for pulses.
- Combining cereals with pulses in the ratio of 3:1 will improve the quality of protein in a meal.
- Vegetarian diets with appropriate combination of cereals and pulses and with the inclusion of nuts and seeds can provide all the EAA. Inclusion of milk in daily diet would further enhance protein quality.
- Non-vegetarian diets can provide quality protein by appropriate combination of cereals, pulses, nuts along with recommended level of fish / poultry / meat / egg (flesh foods and egg contain all the EAA).
- Most athletes can get the recommended amount of protein through appropriate selection of food items. Protein powders are unnecessary and can cause harm.

- Prolonged intake of large amount of protein powders or consumption of high protein concentrate has been associated with potential dangers, such as bone mineral loss and kidney damage.

Limiting amino acids (AA) in plant foods

Foods	Limiting essential amino acids	Compliment with other foods to obtain the limiting AA
Grains (cereals, millets)	Lysine, Threonine, Tryptophan	Pulses, chickpea & beans which are rich in lysine, threonine and tryptophan
Pulses	Methionine	Cereals, millets, nuts and seeds which are rich in methionine
Nuts/seeds	Lysine	Pulses, chickpea, beans (kidney beans, cowpeas)

Why do we need proteins and EAA?

Every part of our body including all the organs have proteins. Proteins are essential for many functions such as making enzymes, hormones, cell membrane components and carrier proteins such as hemoglobin (carries oxygen to tissues). Proteins are also required to replace tissues that are broken down. In addition to the above, growing children require dietary protein for growth to build muscles and bones. Human body requires only 20 AA. Thousands of different types of proteins are made from these 20 AA. Of the 20, nine amino acids are not synthesized in the body, hence these should be obtained from the dietary sources, and these are termed essential amino acids (EAA). A diet with all 20 amino acids, including 9 EAA referred to as good quality proteins, is essential in the maintenance of good muscle mass.

Why should we maintain good muscle mass and how to maintain?

- Maintaining higher muscle mass keeps the bones strong.
- Strong and good muscle mass helps joints move freely, and there is less strain on knee or hip joints; and protects joints from damage.
- Maintaining higher muscle mass improves insulin sensitivity and decreases the risk of diabetes, stroke and heart attacks.
- Maintaining higher muscle mass delays ageing.
- Regular physical activity (including strength exercise) along with a good diet is important for maintaining good muscle mass and muscle function

How much proteins do we need?

- The estimated average requirement (EAR) for protein intake is 0.66g of protein per kg/day for

healthy men and women.

- The recommended dietary allowance (RDA) for protein intake is 0.83g protein/kg/day for healthy men and women (requirements of 97.5% of the population).
- This translates to an EAR of 43g protein/day or RDA of 54g/day for a person weighing 65kg, regardless of physical activity or gender. The protein energy (P:E) ratio should be ideally 10% to 15%; that is, 10% to 15% energy should be from proteins in our daily diet.
- The required quantity of protein and the PE ratio are easily met from the daily diet, but the challenge is the quality; the diets may not provide all the essential amino acids (good quality protein). Hence, food-based allowance is the ideal one for protein recommendation.

How to obtain good quality protein from our diet?

- Of the EAAs, cereals have lower levels of lysine but higher levels of sulphur-containing amino acids (methionine and cysteine). In case of pulses, the reverse is true; pulses have higher levels of lysine and lower levels of methionine and cysteine.
- Therefore, an appropriate combination of cereals with pulses in the ratio of 3:1 (raw food weight) can meet the requirements of all EAA including other amino acids. Addition of 250ml milk in our daily diet can further enhance intake of EAA and in meeting the requirements of all the EAA.
- Non-vegetarians can easily source their proteins from recommended level (700g to 900g/week; marine water fish, poultry or lean meat) of flesh food or egg consumption.
- One should be physically active and ensure that the protein consumed is utilized (muscle atrophy sets in with low physical activity).

Will just protein consumption help build muscle mass?

- No, the dietary protein is not utilized efficiently even if one takes high proteins of good quality without adequate carbohydrate and fats in the diet. Hence, adequate energy from carbohydrates and fats is essential for dietary amino acids (proteins) to be utilized for muscle mass synthesis and for amino-acid related functions in the body.
- In addition, without adequate physical activity, proteins are unlikely to be used for muscle building. One should be physically active and perform strength exercises and ensure that the protein consumed is utilized (muscle atrophy sets in with low physical activity).

How do vegans get enough protein?

- Vegans eating varied diets containing vegetables, beans, grains, nuts, and seeds will have no difficulty in obtaining enough protein from regular diet.
- Appropriate combination of cereals with pulses in the ratio of 3:1 (raw) is the most efficient way to obtain all the nine essential amino acids from a vegan diet.

What are the sources of proteins?

Dietary proteins can be derived from plant and animal sources. Some proteins, especially animal source (meat, poultry, fish, egg and milk) proteins contain all twenty amino acids, including nine EAA, required to make new proteins in the body. Pulses such as lentils, green gram, horse gram, black gram, chickpeas, kidney beans, cowpeas, soyabean and green peas are all rich sources of proteins. Nuts and

seeds such as almonds, pistachios, cashews, walnuts, hazelnuts, chia seeds, pumpkin seeds, flax seeds, and sesame seeds also contain substantial quantity of protein.

Flesh foods, eggs and milk are good sources of quality proteins. Pulses are very important sources of protein in balanced vegetarian Indian diets. Protein obtained from pulses is less expensive compared to meat-based, eggs or milk proteins. Protein quality of a diet is enhanced when pulses are eaten in combination with cereals or cereals are eaten in combination with flesh food, eggs or milk. Pulses are low-fat and high-fibre foods and also contain important vitamins and minerals like iron, potassium, zinc and magnesium.

Most of the vegetarian foods have a protein digestibility range of 70%–85% and a balanced vegan diet for a moderately active man, provides more than 80g crude protein/day. This translates to approximately 60g of quality protein that meets the requirements of all the EAAs.

What are protein powders or protein supplements?

Protein powders are made from either eggs or dairy milk or whey (a byproduct of cheese or paneer) or plant sources such as soyabeans, peas and rice. Some protein powders, marketed in packages as protein supplements, contain protein from multiple sources. Protein powders may also contain added sugars, non-caloric sweeteners and additives such as artificial flavoring, hence, are not advisable to be consumed on a regular basis. Whey protein is rich in branched chain amino acids (BCAAs). Recent evidence suggests that BCAAs may increase the risk of certain non-communicable diseases (NCDs). As mentioned above, adequate non-protein energy from carbohydrate and fat is essential for dietary proteins/AA to be utilized for protein synthesis and for related functions in the body. Consuming high level of protein, especially in the form of protein supplement powders, is therefore not advisable.

Many athletes consume very high amounts of protein, often as protein powders. Protein requirements are not as high as commonly perceived. In fact, research findings indicate that dietary protein supplementation is associated with only a small increase in muscle strength and size during prolonged resistance exercise training (RET) in healthy adults; and protein intake levels greater than ~ 1.6 g /kg/day do not contribute any further to RET- induced gains in muscle mass.

Most athletes can get the recommended amount of protein through food alone, without the use of supplements. Protein powders are not required. Moreover, prolonged intake of a large amount of protein is associated with potential dangers, such as bone mineral loss and kidney damage.

All the amino acids can be easily met if one consumes a healthy balanced diet, whether vegetarian or non-vegetarian. Appropriate combination of cereals: pulses in a ratio of 3:1 or by substituting 30g of recommended level of pulses with 80g meat per day would improve quality of protein to fulfill the needs of a normal person.

Source: ICMR National Institute of Nutrition, Hyderabad - Dietary guidelines for Indians 

Source: <https://data.vikaspedia.in/short/lc?k=mqsyfhpQ1gmmJtb8YLAIVg>



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