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Tips for a Quality Diet in Nepal: Meeting the Body's Needs for Protein

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Introduction

According to a USAID profile of the country, rates of stunted and underweight children in Nepal have decreased in recent years, though they remain high. Estimates from the 2016 Nepal Demographic and Health Survey (NDHS) put stunting rates at 47% for children under five, meaning that they were too short for their age. In addition, the NDHS estimated that 32% of Nepalese children were underweight, or of low weight for age, and 12% were wasted, or too thin for their age (USAID, 2014; NDHS, 2016).

Stunting may have some causes that are not related to nutrition, but a significant contributing factor is the poor nutritional quality of children's diets. A child's stunting may also be linked to their mothers' undernutrition and poor diet quality during pregnancy. Importantly, stunting is likely associated with chronic protein-energy malnutrition and inadequate protein quality on a daily basis (Arsenault and Brown, 2017). Unfortunately, once developmental changes (such as stunting and wasting) that result from poor diet take their toll on proper childhood development, they cannot be reversed (Woodruff *et al*., 2009; WHA, 2012).

Protein Sources and Functions in the Body

Protein has many functions in the body, ranging from building muscles (including the heart), to building hormones that regulate hundreds of processes, to boosting defenses to help us fight infections. However, proteins that are contained in food are not built in exactly the same way as the proteins that are needed by our body. The body must break down food proteins and re-compose them into different arrangements than what is found in food.

Box 1: Complete and incomplete proteins (IOM, 2005)

Complete proteins are provided by meat, poultry, fish, eggs, milk, cheese, and yogurts.

Incomplete proteins come from plants: fruit and vegetables, legumes, grains, nuts, seeds and mushrooms.

Amino acids are nitrogen-containing molecules and the basic elements that make up proteins. There are 20 different amino acids, of which nine are essential, meaning that they must be obtained from our diet. Different foods have different types and quantities of essential amino acids. Some foods have all nine essential amino acids in enough quantities that our body requires, and some do not. In general, foods that come from animals, like meats, fish, eggs, and milks, have all of the essential amino acids that we need. There are some exceptions to this, for example collagen and keratin are animal proteins that do not have all essential amino acids in quantities required

Box 2: Plant foods that can be combined to provide the body with complete proteins

- Rice and beans
- Rice and lentils
- Barley and beans
- Beans and corn
- Grains and nuts
- Beans and nuts

by a human body. Conversely, foods that come from plants often do not have all of the essential amino acids or have them present in lower quantities than our bodies need. Again, there are exceptions to that rule: plant foods that use whole grains like quinoa, spirulina, amaranth, and soy contain all of the essential amino acids. Based on this distinction, we may assemble individual foods with proteins into two groups: foods with complete proteins and foods with incomplete proteins.

Combining two or more foods with incomplete proteins can provide the body with the full set of amino acids that it needs. (Young and Pellett, 1994; IOM, 2005; Woolf *et al*, 2011). However, in order for the body to be able to make a complete protein from these foods, they should be eaten within the same day. See Box 2 for effective ways of combining incomplete proteins to achieve a good combination of amino acids. When combing plant proteins, proportions are important: one spoonful of beans with a bowl of rice is not sufficient. But, if you replace about one-third of that rice with beans, that would provide a good balance of all of the building blocks for proteins in your body (Young and Pellett, 1994).

Photo: Most individual plant-based foods do not have the full set of amino acids ("protein building blocks") our bodies need. However, combining two or more plant-based foods in a meal, such as lentils and rice, will provide us with complete protein.

Protein Needs by Age and Gender

It is suspected that a diet relying only on plant-based protein sources is not adequate for children's nutritional needs. Children need more foods with "high-quality" proteins as compared to adults, meaning that they need more proteins from animal sources, which provide complete amino acids that are easily digestible and that provide more energy than plant-based proteins. Children's bodies may require approximately double the proportion of high-quality proteins as is required for adults: many suggest that at least 30% of children's protein intake come from high-quality sources (Young and Pellett, 1994; Ghosh *et al.*, 2012; Semba *et al.*, 2016).

Protein needs vary by gender as well. Table 1 provides recommendations for protein needs for different age groups and genders, as well as guidelines for pregnant and nursing women (IOM, 2005). The second column shows the needs as calculated for a standardized person and the third provides Recommended Dietary Allowance (RDA) of proteins per unit of body weight. Considering the fact that at any age body size between people may vary in some situations (mostly in clinical setting) we may want to calculate individual protein needs instead of using the daily protein needs as given for a standardized person (example Box 3). Amounts recommend by World Health Organization (WHO) are slightly lower than provided in this table (WHO, 2007).

Box 3: Example of protein need calculations using RDA

<u>Girl: 13 years old, weight 48 kg</u>

Protein RDA 0.95g/kg of body weight/day

Her calculated protein needs: 0.95g/kg/day x 48kg = 45.6g of protein per day

<u>Boy: 1 year old, weight 8kg</u>

Protein RDA 1.05g/kg of body weight/day

His calculated protein needs: 1.05g/kg/day x 8kg = 8.4g of protein per day

Table 1. Protein needs of children, women, and men (IOM, 2005)

Age	Daily protein needs per standardized person (in grams)	RDA (grams for kilogram of body weight per day)
Children 7-12 months old	11	1.2
Children 1-3 years old	13	1.05
Children 4-8 years old	19	0.95
Children 9-13 years old	34	0.95
Girls 14-18 years old	46	0.85
Boys 14-18 years old	52	0.85
Women 19+	46	0.80
Men 19+	56	0.80
Pregnant and nursing women	71	Pregnant 1.1+25g/day Nursing 1.3+25g/day

Infants who are 6 months of age and younger receive adequate protein if they are breastfed. There is no need to supplement any food for infants of that age if the mother is capable of nursing (IOM, 2005). It is recommended that breastfeeding continue for children who are between 6 and 12 months of age (or even older), but at this age their protein needs can also be met by foods from other sources, such as cooked pureed/mashed pulses, cooked and strained (pureed/mashed) meats, milk and eggs (WHO, 2009). Table 2 provides information about the protein content of animal milk that are commonly consumed by humans.

Table 2. Protein content of animal milks (USDA, 2017; *USDA, 2008)

Type of Animal	Grams of protein in 100 g of milk
Cow	3.3
Sheep*	6.0
Goat	3.6

It is important not to provide less or "lighter" food to children (and sometimes adults) who are sick. Infections, fever, and recovery processes increase the body's requirements for proteins, and in particular, for proteins that are high-quality and easy to digest (Pencharz *et al.*, 2014; Pillai *et al.*, 2015).

Photo: Protein from animal-based foods, like milk, is of high quality and easily digestible. It is important that at least 30% of children's protein intake comes from animal-based foods.

As previously mentioned, adults have different protein needs compared to children, ranging from 46-56 grams per day for women and men, and around 71 grams per day for pregnant and nursing women. Table 3 (next page) provides information about the protein content of specific foods in a quantity that may be considered one serving for an adult. Each serving is compared to an object from everyday life for an easier estimation of how much is needed. Because protein content may vary slightly between different preparations of these foods, the numbers should be treated as a guideline (IOM, 2005; USDA, 2017).

Table 3. Approximate protein content in one serving of common foods

Food	Serving size	Protein per serving (in grams, approximate)	Serving size compared to everyday objects (approximate)
Animal-Based Foods			
Meats (beef, poultry	85 grams (3 oz)	20-25	Similar to the size of a deck of cards or the palm of the hand of an average adult
Fish	85 grams (3 oz)	16-20	Similar to the size of a deck of cards or the palm of the hand of an average adult
White, soft, unaged cheese	100 grams	15-20	About half of the size of a regular (incandescent) light bulb, half of a tennis ball. Note that moisture/water content may change the weight of cheese
Milk, yogurt	200 grams	6-8	Similar to the size of a regular (incandescent) light bulb, a tennis ball, or an average woman's fist
Hard, aged (yellow) cheese	28 grams (1oz)	6-8	Similar in size to four stacked dice or one domino
1 large chicken egg	57 grams	6-7	The amount of protein in an egg changes with its size. A large egg will have more protein than a small one. Very small eggs may have 4 or 5 grams of proteins.
Plant-Based Foods			
Lentils (cooked)	200 grams	17-19	Similar to the size of a regular (incandescent) light bulb, a tennis ball, or an average woman's fist
Soy beans (cooked)	200 grams	35-37	Similar to the size of a regular (incandescent) light bulb, a tennis ball, or an average woman's fist
Beans and peas (cooked)	200 grams	15-20	Similar to the size of a regular (incandescent) light bulb, a tennis ball, or an average woman's fist
Peanuts (roasted)	28 grams (1oz)	7-8	About 25 nuts*
Almonds (raw)	28 grams (1oz)	5-6	About 25 nuts*
Pistachios (raw)	28 grams (1oz)	5-6	About 50 nuts*
Cashews (raw)	28 grams (1oz)	5-6	About 20 nuts*

* USDA National Nutrition database. Nutrition 411

In addition to foods presented in Table 3, fungi (or mushrooms) can be a good source of protein. For example, 100 grams of whole white mushrooms have around 6 grams of protein (USDA, 2017). However, mushrooms harvested from the wild may be unsafe to eat and may have very different protein contents, and so they may not be a reliable source of protein. Vegetables such as carrots, broccoli, and many others also provide protein, but in smaller quantities. The same is true for fruit.

Conclusion

The name “protein” is derived from a Greek word “proteios,” which means "primary," "in the lead," or "standing in front," and there is no doubt that they are extremely important for proper growth and development of infants and children and for health and maintenance of the adult body. Protein needs change with age and with a size of a body, but there is no life stage in which the needs for protein can be replaced by another nutrient, or in which a lack of protein will not result in impairment of growth or health. Different foods provide different amounts and quality of proteins, but with some knowledge and planning it is possible to provide each person with an adequate amount of food proteins to support the body’s requirements. At the same time, we need to remember that there are other nutrients, such as carbohydrate, fat, minerals, vitamins, and water, that we need every day. Therefore, a meal that is diverse and colorful will provide many different nutrients that are beneficial to our health and wellbeing.

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