



Protein Deficiency: Challenges and Means to Fight

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A growing global population, combined with changing socio-demographics, will increase pressure on the world's resources to provide not only more but also different types of food. Increased demand for nutritious food reflected in increased demand for protein globally due to nutritionally rich status of protein among food constituents. Protein, an important nutrient for the human body involved in the constitution of human tissues and the regulation of various physiological functions. Protein is essential for body growth and development and provides energy. Protein deficiency can cause retarded growth and development, fatigue, and nutritional edema, and even might be life threatening [5,6]. Around 140 of every 1000 children in Africa die before 5 years of age due to malnutrition. The protein consumption in the world is 77g/person/day but in case of developing countries it is 70 g/person/day and in sub-Saharan Africa it is as low as 55 g/person/day [3,4]. Though the international focus on the 'protein gap' faded away after the mid-1970s, FAO/WHO expert committees continued to address protein and amino acid requirements and protein quality evaluation in human nutrition. Recent studies challenge the widespread assumption that young children in developing countries receive sufficient dietary protein [6]. World-wide millions of children subsist on staple foods that are poor sources of essential amino acids, such as cassava and maize [7]. Protein quality considered more important than protein quantity which takes into account essential amino acid composition and digestibility [10,11].

Currently vegetable sources dominating the global protein supply (57%), with meat (18%), dairy (10%), fish and shellfish (6%) and other animal products (9%) are making up the remainder [2]. In the case of protein, the negative impact is mainly associated with animal-derived protein with reports that 12% of greenhouse-gas (GHG) emissions from livestock production. Health issues also arise with over-consumption of protein, particularly when associated with saturated fatty acids and over consumption of processed meats. Rice, maize, and wheat are the main staples worldwide along with millet which is widely consumed in African

countries. In India, where rice and millet are staple foods, protein malnutrition is common among infants [11]. Plant-based protein sources often deficient in one or more of the amino acids thus fail to meet human nutritional needs solely. Combinations of different proteins, including cereal-pulse combinations and supplementation can help to overcome amino acid imbalance in strict vegan or vegetarian diets [8].

The global market for dairy protein is complex, multifaceted and driven by evolving markets. With the advent of membrane separation technologies, a diverse portfolio of protein ingredients having tailored functional and nutritional attributes is created. Milk protein which is rich in all essential amino acids forms a gel in the gut and takes higher time to get absorbed. So, it can work as a prolonged source of amino acids and energy, preventing muscle protein break down [1]. Recent studies demonstrated the effect of whey proteins in maintaining muscle mass due to presence of branched chain amino acids.

Diets in developing countries are limited and conservative too. In this context increasing the protein content in normal diet is the appropriate step to fight against protein deficiency. According to a report published by Future Market Insights, global protein market is expected to witness a CAGR of 5.6% during the period 2018 to 2028. Different sources of protein like fish protein, single cell protein, oil seed protein along with different plant proteins have been tried for fortification in various foods. Milk protein being a rich source of all essential amino acids can be primarily used to supplement the protein deficit diets of both vegetarian and non-vegetarian diets. According to protein digestibility corrected amino acid score (PDCAAS), which is based on availability of essential amino acid as well as digestibility, milk protein is better option than soy, beef or wheat protein for supplementation and/or fortification [9]. Milk derived protein rich products viz. milk protein concentrate, whey protein concentrate and whey protein isolate can be utilized as protein sources for supplementation in various food to overcome protein deficiency.

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