

Fish for Fighting Malnutrition

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Though it is bitter to accept, nutrient deficient diets are a fact of everyday life for hundreds of children. Food that cannot provide the right blend of energy including high-quality protein, essential fats, and carbohydrates as well as vitamins and minerals definitely impair growth and development, the risk of death from common childhood illness, or result in life-long increase health consequences. Current approaches to address malnutrition in children have serious limitations. Exclusive breastfeeding meets nutritional needs until six months of age, and beyond that, young children need 40 essential nutrients to grow and be healthy. Interestingly, fish is probably the most cheapest to provide all the 40 essential nutrients a young child needs to grow and be healthy. Fish especially seafood is an excellent resource for proteins, vitamins, trace elements and polyunsaturated fat (omega-3 fatty acids). The details about the importance of seafood in lowering the risk of malnutrition are relatively scanty.

Fish and other marine life are rich sources of ω -3 Fatty acids [EPA & DHA], especially the low value fishes such as sardine, mackerel, anchovies etc. It is very much interesting to observe that big eyes of tuna are very much rich in EPA and DHA, which constitute around 70-75% of total PUFA. EPA and DHA are very much essential for the development of brain and heart tissue. EPA and DHA play a major role in maintaining health of the young children by modulating the lipid metabolism. These ω -3 fatty acids also regulate prostaglandin metabolism, which regulates the vascular functions in growing children. They also have influence on kidney function by modulating the retention of water and removal of excess sodium, which plays a major role in the behavior of kids. DHA is critical to normal eye and vision development in the early and later parts of the human beings. Along with linoleic acid it makes > 1/3rd of FA in human brain and retina. DHA also increases memory power of young children. A person can expect good health if he or she consumes 0.5-1g of PUFA/day.

High content of highly digestible protein, amino acids viz available lysine, methionine and cysteine and minerals makes fish protein a highly nutritious product. Fish contain all the essential amino acids in required proportion and hence have a high nutritional value. The non-protein amino acid taurine is present in rich quantities in seafood. Histidine content is high in proteins of mackerel. Fish proteins lessen the risk of microalbuminuria in young children. Fish protein powder can be used to formulate infant foods, soups and protein containing beverages to enhance their protein content & nutritive value. It can be very well considered as milk replacer. Fish proteins can be incorporated as a protein supplement in children diet. Fish protein hydrolysate prepared from low value fishes contains important bioactive peptide fraction like gastrin, calcitonin gene related peptides (CGRP) and some growth promoting peptides which play a key role in our metabolic path ways. Collagen is found in skeleton, fins,

skin and air bladder (source of pure collagen) of fish. Collagen powder is a very good source of all amino acids required for the synthesis of extra cellular matrix protein of connective tissue in young children. Its supplementation is also beneficial in the normal functioning of fragile bone joints, which is essential in the case of athletic young children. Supplementation of chitosan prepared from shell fish exoskeleton supplementation helps to overcome lactose intolerance in young children by influencing the microflora associated with gut. On hydrolysis of chitin (exoskeleton of crustaceans) with concentrated acids under drastic conditions gives relatively pure amino sugar D-glucosamine. It is essentially required for the construction of cartilage - the tough connective tissue that cushions the joints in young children. Glucosamine stimulates the production of glycosaminoglycans (the key structural components of cartilage) as well as the incorporation of sulfur into cartilage. Glucosamine is effective for easing osteo pain, aiding in the rehabilitation of cartilage, renewing synovial fluid, and repairing joints, which are very much common occurrences in young growing children.

Fish meat is a good source of B vitamins (red meat > white meat). Fish liver, eggs, milt and skin are good sources of B1, riboflavin, pyridoxine, folic acid, biotin and B12- Hence, fish intake is capable of preventing various anemias in young children. Fatty or semi fatty fishes are excellent sources of vitamin D. Anti-hemorrhage factor Vitamin-K is also present in fish. In fish flesh Vitamin E occurs as α -tocopherol, a potent antioxidant vitamin involved in counteraction of free radical mediated oxidative damage to the cell membranes. Large quantity of vitamin E (500-3000) is present in liver and body oils. Hepatic reserves of Vitamin A is much greater in fish compared to mammals and birds. Liver oils from shark and Tuna are rich in Vitamin A & D.

Fish and shellfish are valuable sources of Ca & P, also contains Fe, Cu, Se. Calcium powder from back bone of tuna can be used to combat calcium deficiency in diet, particularly of children. Calcium deficiency can lead to bone failure and spine curvature in children. Salt water fish have high content of iodine-good for brain function. Sodium content is low – makes it suitable for low sodium diets. Tuna are sources of macro mineral Mg, which contributes to hardness of bone and acts as co factor for certain enzymes important in nerve & muscle function. Tuna is also an important source of essential antioxidant trace element Se -provides protection against heavy metal poisonings & a variety of carcinogens. Crustaceans and shellfish are richest source of Cu-essential for normal blood formation, maintenance of blood vessels, tendons and bones and health of central nervous system.

Squalene, an isoprenoid molecule present in fish liver oils, is capable of carrying oxygen at the cellular level, causing further improvement in organ function through cellular metabolism. In today's polluted environment, lack of exercise and poor lifestyle, it may be a potential source of oxygen for young children. It also helps to regulate the menstrual cycle and improves irregular and abnormal cycles in teenage female children. Squalene can be used as an immunoprotector in children. It also acts as relaxant, giving added vigor and vitality

without the hyper-activity associated with other food supplements, generates hair and smoothens skin.

Unfortunately, most current food aid programs for developing countries, especially in India rely almost exclusively on the fortified cereal blend of corn and soy that may relieve a young child's hunger, but does not provide proper nourishment. Programs that respect the minimal nutritional needs of infants and young children, and work with countries most affected by the crisis to put access to nutrient-rich foods at the center of their efforts to tackle childhood malnutrition have to be adopted vigorously. Definitely promoting fish as health food alleviates early childhood malnutrition. It has to be done through direct nutrition programs that ensure infants and young children from even the poorest families. Marine organisms are potential sources of variety of compounds with nutraceutical applications to reduce malnutrition. Yet there is little has been explored in this aspect. Further researches have to be carried out to utilize the fishery resources for fighting malnutrition in young children.