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THE NUTRITIONAL POWERHOUSE: UNDERSTANDING THE ROLE OF FISH IN DIET

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Many people worldwide are presently experiencing one or more types of nutritional deficiencies. Especially in a society where there are ways and the knowledge to put an end to this calamity, this continues to be a mockery of the recognized fundamental human right to enough food and freedom from hunger and malnutrition (Tacon, A.G.J., 2001). From 3.9% in 1970 to 36.0% in 2006 it shows rise in aquaculture contribution to global fish supply and now it currently exceeds all other animal food-producing sectors. Fish is essential for livelihoods, income, and food for the rural poor, who are disproportionately affected by undernutrition, especially micronutrient deficiencies, in many low-income nations that have access to water and fisheries resources (Thompson and Subasinghe, 2011). Fish is an important component of human nutrition and an excellent food. A third of the world's population gets 20% of their protein from fish, with this percentage being higher in developing nations. Seafoods provide a comprehensive and distinct supply of macro and micronutrients needed for a balanced diet (Thilsted et al., 2014). Additionally, fish is a great source of health-promoting fats, particularly omega ω-3 Polyunsaturated fatty acids (PUFAs), Eicosapentaenoic acid (EPA), and Docosahexaenoic acid (DHA). Small indigenous fish (SIFs) are particularly rich in micronutrients, which may help eliminate diseases associated with micronutrient deficiencies that are common in developing nations (Mohanty et al., 2016a; 2017).

Amino Acids

Traditional classifications for amino acids (AAs) include nonessential (NEAA), conditionally essential (CEAA), and essential amino acid (EAA). NEAAs contains aspartic acid, serine and alanine; CEAAs are glutamine, glutamic acid, glycine, proline, and taurine; EAA are Arginine, cystine, histidine, leucine, lysine, methionine, threonine, tryptophan, tyrosine, and valine (Wu, 2010). Fish is a significant and high-quality source of animal protein; studies have shown that fish protein has a higher satiety impact than other animal protein sources, such as beef and chicken (Uhe et al., 1992).

For aspartic acid and lysine, cold water species is suggested, marine fishes for leucine and small native fish suggested for histidine. Carps and catfish are suggested for glycine and glutamic acid (Mohanty et al., 2014).

Arginine is essential for immunological response, wound recovery, hormone release, cell division, ammonia clearance, neurotransmission, blood clotting and blood pressure and Leucine helps in stimulation of muscle protein synthesis (Etzel et al., 2004).

The fish with the highest methionine concentration is the marine fish *S. waitei* (4.0 ±0.4 g 100−1 g protein) and the cold-water fish *T. putitora* (3.6±0.3 g 100−1 g protein), which is even greater than the methionine level of mutton (Löest et al., 1997). Methionine cures liver problems, contains wound healing properties, and treating depression, alcoholism, allergies, asthma, copper poisoning, radiation side effects, schizophrenia, drug withdrawal, and Parkinson's disease (Mischoulon et al., 2002).

Glutamic acid found abundant in carps which helps in transamination reaction and glutathione helps to remove toxic peroxides and the polyglutamate folate cofactors. It was discovered that the catfish *H. fossilis* has the highest concentration of glycine (Kaushik et al., 1998). In addition to its role in promoting protein synthesis and wound healing, preventing tissue damage, increasing antioxidant activity, and treating metabolic disorders in obesity, diabetes, boosting immunity, ischemia-reperfusion injuries, cancer, and a variety of inflammatory diseases, glycine also plays a significant role in cardiovascular disease (Wang et al., 2013).

T. putitora was found to have the highest tryptophan content of all the fish. The neurotransmitter serotonin, which is thought to reduce pain, is derived from tryptophan (Segura 1998).

Marine fish like *Rastrelliger kanagurta* is rich in histidine. In addition to being a precursor to histamine, histidine is involved in several aspects of protein interaction. It is also necessary for the body to eliminate heavy metals, maintain myelin sheaths, and support tissue growth and repair (Liao et al., 2013).

The two primary conditions associated with protein-energy deficiency are marasmus syndrome and kwashiorkor. Marasmus is caused by an energy deficit while kwashiorkor is caused by a protein deficiency. third condition where symptoms of both kwashiorkor and marasmus are presents called as marasmic kwashiorkor (Kickstart). Study revealed that the percentage of this syndrome is almost double in non- fishing community when compared to fishing community (Mlauzi and Mzengereza, 2017).

Vitamins and Minerals

Studies on the vitamin A, D, E, and K content of a few tropical food fish have revealed that native small fish had significantly higher vitamin content than larger fish. As a natural dietary supply of vitamin D, fish can be quite beneficial. Numerous vitamin D-rich species of Indian food fish, such as *A. mola, Puntius sophore, S. longiceps, and Epinephelus Spp*., can be a good source of vitamin D. Shark liver oil and cod liver oil is highly regarded for having a high level of vitamin A & D (Rusoff et al., 1943) (Copping, 1934). Vitamin A is important for maintaining cell development, the development of bones and teeth, and the treatment of many ailments related to the eyes. It also plays a major role in improving impaired eyesight (Hernandez et al., 2020). While vitamin K is necessary for blood coagulation and aids in the prevention of internal bleeding in the body, vitamin B speeds up the activity of enzymes, which facilitates chemical reactions in the human body (Khalili Tilami, S., & Sampels, S, 2018).

Fish provide the majority of micronutrients with good bioavailability in the range of 0.4 to 1.5%. A few micronutrients like iodine, selenium, magnesium, zinc, and calcium, are more prevalent in aquatic animals than in other sources, such as mammalian meats or plants (Marques et al., 2019).

Fats

The range of ω-3 and ω-6 fatty acid content in total fat of the fish and shellfish under study is 12.3–43.5% and 1.9–34.1%, respectively. ω-3/ω-6 ratio is an important metric for identifying the quality of fat as a higher amount of ω-6 fatty acids promote the pathogenesis of many diseases, cancer, inflammatory and autoimmune diseases, whereas elevated levels of ω-3 PUFA exert inhibitory effects (Simopoulos, 2002). Studies indicated that ingestion of n-3 polyunsaturated fatty acids (PUFAs), especially docosahexaenoic acid (DHA) and eicosapentaenoic acid (EPA), which are contained in fish oil, can be useful for cancer and cardiac treatment by retaining nutritional status (Silva et al., 2015).

The majority of the fatty acids in the SIFs are UFA such oleic acid and linolenic acid. Since the human body is unable to produce linoleic acid (18:2) or linolenic acid (18:3), these fatty acids are regarded as needed for diet.

Conclusion

The ω -3 PUFA are the primary emphasis when it comes to the nutritional value of fish and other seafood products. First and foremost, ω -3 PUFA are important to consider when eating fish and the nutritional value associated with these products. Moreover, it is becoming widely clear that fish's proteins and peptides have an impact on human health issues in addition to their high nutritional importance. Additionally, a number of minerals, vitamins, and micronutrients can be found in fish which helps to cure various problems in human body.

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