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Omega Fatty Acid Value of Seafood and Its Place in Human Health

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Abstract Today, health problems due to fast food-style irregular diet have reached the dimensions that can not be underestimated in some western countries and Turkey. Especially in developed countries, people are very careful about their diets and care to choose appropriate foods for their health. Among these foods, fish and other aquatic products that are rich in unsaturated fatty acids are the first order. Unsaturated fatty acids are found in nature this types; omega-3, omega-6 and omega-9. Eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA) are linolenic series omega-3 fatty acids. These are two important fatty acids found in all seafood and not found in other foods. It is known that these two fatty acids cause significant biochemical and physiological changes in the body. Omega-3 fatty acids are proposed because of their beneficial effects in the prevention and treatment of many diseases affecting human health. In this study, the importance of fish oil which is a valuable food due to its high omega fatty acid content and the importance of human health will be examined.

Keywords Fish, fatty acid, omega, health

Introduction

Fish and other seafood, which are at the beginning of people's oldest food sources, have an important place in healthy nutrition. The fish, rich in protein content, is a source of good quality protein such as eggs, meat and milk. It is rich in fish meat, vitamins A, D vitamins K vitamins and B group vitamins (B_1, B_2, B_6 and B_{12}). It is also a good source of iodine, selenium, phosphorus, magnesium and zinc minerals. Polyunsaturated fatty acids cannot be produced in the human body and therefore must be taken directly into the body through foods, are the most important sources of EPA (eicosapentenoic acid) and DHA (docosahexaenoic acid).

Protein Content of Seafoods

Seafood is a high-protein food that is low in calories, total fat, and saturated fat. High in vitamins and minerals, seafood has been shown to have numerous health benefits. Seafood is generally considered to be a low-calorie protein source. Most low-fat species of fish, such as cod, flounder and sole, 100% calories per 3-ounce cooked portion, and even fattier fish like mackerel, herring, and salmon have about 200 calories per serving. Seafood is a complete protein source. It contains enough of the essential amino acids to assure healthy growth and optimal fetal development. A 3- ounce serving of most fish and shellfish provides about 30-40% of the average daily recommended amount of protein. The protein in seafood is easier to digest because seafood has less connective tissue than red meats and poultry.

Vitamin Content of Seafoods

Fish is a rich source of vitamins, particularly vitamins A and D from fatty species, as well as thiamin, riboflavin and niacin (vitamins B_1, B_2 and B_3). Vitamin A from fish is more readily available to the body than from plant foods. Vitamin A is required for normal vision and for bone growth. Fatty fish contains more vitamin A than lean species. Studies have shown that mortality is reduced for children under five with a good vitamin A status.

As sun drying destroys most of the available vitamin A better processing methods are required to preserve this vitamin [1-2].

Vitamin D present in fish liver and oils is crucial for bone growth since it is essential for the absorption and metabolism of calcium. Thiamin, niacin and riboflavin are important for energy metabolism. If eaten fresh, fish also contains a little vitamin C which is important for proper healing of wounds, normal health of body tissues and aids in the absorption of iron in the human body.

The minerals present in fish include iron, calcium, zinc, iodine (from marine fish), phosphorus, selenium and fluorine. These minerals are highly 'bioavailable' meaning that they are easily absorbed by the body. Iron is important in the synthesis of hemoglobin in red blood cells which is important for transporting oxygen to all parts of the body. Iron deficiency is associated with anemia, impaired brain function and in infants is associated with poor learning ability and poor behavior. Due to its role in the immune system, its deficiency may also be associated with increased risk of infection [3].

Calcium is required for strong bones (formation and mineralization) and for the normal functioning of muscles and the nervous system. It is also important in the blood clotting process. Vitamin D is required for its proper absorption. The intake of calcium, phosphorus and fluorine is higher when small fish are eaten with their bones rather than when the fish bones are discarded. Deficiency of calcium may be associated with rickets in young children and osteomalacia (softening of bones) in adults and older people. Fluorine is also important for strong bones and teeth.

Zinc is required for most body processes as it occurs together with proteins in essential enzymes required for metabolism. Zinc plays an important role in growth and development as well in the proper functioning of the immune system and for a healthy skin. Zinc deficiency is associated with poor growth, skin problems and loss of hair among other problems.

Iodine, present in seafood, is important for hormones that regulate body metabolism and in children it is required for growth and normal mental development. A deficiency of iodine may lead to goiter (enlarged thyroid gland) and mental retardation in children.

It is evident that fish contribute more to people's diets than just the high quality protein they are so well known for. Fish should therefore be an integral component of the diet, preventing malnutrition by making these macro and micro nutrients readily available to the body.

Fatty Acid Content of Seafoods

Approximately 1,000 fish and shellfish species are consumed in the world [4], varying in nutritional and sensorial characteristics. Fish can be classified depending on the environment where they live: freshwater or marine; pelagic (next to the ocean surface) or demersal (bottomfish) [5-6]. Fish have also been classified according to their lipid content [7].

- Lean fish (cod, yellow perch): < 2% fat
- Low fat fish (flounder, halibut): 2-4 % fat
- Medium fat fish (salmon): 4-8 % fat
- High fat fish (mackarel): > 8% fat

Fish, like all other vertebrates studied so far, require three long chain polyunsaturated fatty acids PUFA for their normal growth and development including reproduction: docosahexaenoic acid (DHA, 22:6n-3), eicosapentaenoic acid EPA, (20:5n-3) and arachidonic acid AA, (20:4 n-6). The biochemical, cellular and physiological functions of these three PUFA are broadly the same in fish as in other vertebrates and fall into two categories: a an apparently generalised role in maintaining the structural and functional integrity of cell membranes; b a more specific role as precursors of the group of highly biologically active paracrine hormones known collectively as eicosanoids [8-11].

In fish, as in terrestrial mammals, DHA, EPA, and AA are all involved in maintaining cell membrane structure and function. However, in fish DHA and EPA and not AA are the major PUFAs of cell membranes, the converse being true in terrestrial mammals. An exception to this statement in terrestrial mammals is neural tissues including the eye where DHA can be very abundant in some cell membranes, especially rod cell outer segment membranes and the membranes of synaptic junctions.

These cell membranes in fish are particularly rich in DHA. Consequently, fish tissues in general have much higher concentrations of DHA and EPA than AA and fish have correspondingly high dietary requirements for ny3 PUFA, a situation reflected historically in the marked emphasis on DHA and EPA, the so-called 'ny3 HUFA', in fish nutrition. This should not, however, obscure the fact that AA, though generally a minor component of fish cell membranes, can and does fulfil a membrane structural role in fish which, although largely unassessed, is not necessarily trivial [11].

The Fishes Nutritional Value

Dietary lipids play important roles in the energy production processes of animal tissues and as the source of essential fatty acids (EFA). Besides these functions they do have other important dietary roles as carriers of certain non-fat nutrients, notably the fat-soluble Vitamins A, D, E and K. Recent studies on EFA in fish EFA requirements of fish differ considerably from species to species. On the other hand, the results of the energy requirements of fish that in the carnivorous fish such as rainbow trout, eel, yellowtail and plaice utilize carbohydrates of high mol. Dietary lipids play an important role in this respect and have a sparing action on dietary protein [12].

Omega Fatty Acids in Brain Development

The clearly evident need of the developing human brain for sufficient supplies of n-3 EFA (particularly 22:6n-3, DHA) may have been an important nutritional factor facilitating the expanding volume and complexity of brains during evolution of thinking hominids, Homo sapiens. Humans appear to have adapted to coastal marine environments in Africa by 125,000 years ago and expanded and dispersed out of Africa along coastal and riparian regions where n-3 HUFA are abundant in seafood and fish [13].

Omega Fatty Acids in Coronary Heart Disease

Low intakes or blood levels of eicosapentaenoic and docosahexaenoic acids (EPA + DHA) are independently associated with increased risk of death from coronary heart disease (CHD). In randomized secondary prevention trials, fish or fish oil have been demonstrated to reduce total and CHD mortality at intakes of about 1 g/day. Red blood cell (RBC) fatty acid (FA) composition reflects long-term intake of EPA + DHA. The Omega-3 Index may represent a novel, physiologically relevant, easily modified, independent, and graded risk factor for death from CHD that could have significant clinical utility [14].

Omega Fatty Acids and Cancer

There is both epidemiologic and experimental evidence that the long-chain omega-3 fatty acids (FAs), which occur at high levels in some fish oils, exert protective effects against some common cancers, notably those of breast, colon, and, perhaps, prostate. Multiple mechanisms are involved in this chemopreventive activity, including suppression of neoplastic transformation, cell growth inhibition and enhanced apoptosis, and antiangiogenicity; however, a common feature of most of these biological effects is the inhibition of eicosanoid production from omega-6 FA precursors. Several of the known risk factors for breast, and colon, cancer may be favorably modified by dietary omega-3 FA supplementation, and the implementation of clinical chemoprevention trials is now feasible [15].

Hypertension and Omega Fatty Acids

There is considerable evidence from population, clinical and experimental studies that long-chain omega-3 (ω3) fatty acids derived from fish and fish oils are protective against atherosclerotic heart disease and sudden coronary death. Eicosapentaenoic acid (EPA; 20 : 5 ω3) and docosahexaenoic acid (DHA; 22 : 6 ω3), the two main ω3 fatty acids, have multiple effects leading to improvements in blood pressure and cardiac function, arterial compliance, vascular reactivity, lipid metabolism, reduced cell cytokine formation, antiplatelet and anti-inflammatory effects and reduced oxidative stress. Clinical trials in humans have shown that EPA and DHA have differential effects on lipids, blood pressure and heart rate, vascular reactivity and platelet function [16].

Conclusion

As a result, eating habits are changing due to the changing living conditions today. In eastern countries as well as western countries, fast food-style nutrition is well known. Fish from the sea and fresh water have an important and nutritious place when we are fed. Many aquatic products are an excellent source of vitamins and minerals for human nutrition. Aquatic products with a high degree of digestion in protein sources are much lower in fat percentage than other high protein nutrients. In addition, aquatic products are the only source of n-3 series highly unsaturated long chain fatty acids that have proven to be good for their health. Studies have shown that two predominant omega-3 fatty acids, eicosapentaenoic Acid (EPA) and docosahexaenoic acid (DHA), found in water products, have a positive health impact. These two fatty acids lead to important biochemical and physiological changes in the body. Omega-3 fatty acids are suggested for their beneficial effects in the prevention and treatment of diseases such as heart disease, cancer, diabetes, and high blood pressure that affect human health. Due to these characteristics, it is considered that future studies on seafood will increase.

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