

## Significance Of Nutritional Value Of Fish For Human Health



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### Abstract:

Nutrients are the substances which give nourishment to the body and promote growth. These nutrients are present in varieties of foods in various amounts. Fish is a source of aquatic food which can both be farmed and wild caught. Fish is rich in macronutrients: proteins, lipids and ash and micronutrients: vitamins and minerals. Proteins in the fish have immunoglobins that acts as defense mechanism against viral and bacterial infections and prevent protein calorie malnutrition. Lipids mainly LC n-3 PUFAs like EPA and DHA prevents cardiovascular and coronary heart diseases and maintains blood pressure and neuro-development in child. Selenium is important for the function of thyroid gland. Iron helps in synthesis of hemoglobin and prevents the occurrence of anemia. Calcium and vitamin D naturally present in fish prevents rickets, low bone-mineral density and osteomalacia. Vitamin A in fish helps in normal growth, formation of bones and teeth. Despite these importances, fish is still undervalued and less consumed compared to other animal protein sources due to lack of awareness. If the per capita consumption of the fish can be increased, then people can have many health benefits. People should be made known about the health benefits of fish. Many other researches should be conducted to make the nutritional value of fish known to the world.

**Keywords:** Fish, Nutrient, Health, Aquaculture.

### 1.0. Introduction:

Nutrients are the substances which nourish the body, promote growth, maintain and repair body parts [1]. Nutrients can be divided into micro and macro nutrients which both are vital for good health. Macronutrients such as proteins, lipids, ash and carbohydrates are present in the fishes [2]. Micronutrients such as vitamins and minerals are essential dietary elements that are essential in very small quantities i.e. they must be supplied from outside sources to the body [3]. Fish as a food has been playing key role in providing the nutrient to many animals as well as humans. Fish is a good source of food but also have high nutritional value which improves health. Fish consumption in daily basis also has its role in the prevention of heart diseases [4].

Moisture, proteins, fats, minerals and vitamins are important micro and macro nutrients that are responsible for implying nutritional value to the fish meat [5]. Compared to other protein sources, macro and micro nutrients available in the fish makes it better [2]. Fish provides essential nutrients especially proteins of high biological values and fats, so it is often referred as 'rich food for poor people' [6]. Protein and fats are the major nutrients of fish which determine the nutritional value of fish [2]. Fish is a food with excellent nutritive value, which provides high quality protein and a large variety of vitamins and minerals i.e. vitamin A & D, magnesium and phosphorus [7]. The micro and macro nutrients present in fish makes it better from other animal protein sources [6]. Apart from being food source, fish also functions to prevent human beings from variety of diseases in the world [8]. Fish contains 15-20% protein of its overall live body weight. The fish protein contains the essential amino acids which improves the overall nutritional quality of a mixed diet [3,6]. A portion of 140gm of fish can provide about 50-60% of the daily protein required by an adult human [9]. Fish is also rich in micronutrients which tend to be more easily available than those from plant foods [2]. As compared to land living animals, fishes are a rich source of protein and have a high content of omega-3 long chain poly unsaturated fatty acids [10].

Humans consume fish in variety of ways by making different dishes. Fish has been an important food in the diet of humans, early before the beginning of the civilization [10]. It has better availability and affordability than other animal protein sources. It is the cheapest source of animal protein. It is useful for people from health point of view as it provides proteins, oils, vitamins and minerals [3]. Fish can be beneficial to be consumed whole as it shows high protein-fat ratio as compared to meat of goat, lambs, buffalo and chicken [5]. In Nepal, fisher communities like Tharu, Chaudhary, Jalari, etc are involved in fishing activities. Their main food is small indigenous species (SIS) captured from nearby rivers, lakes, marshy lands, reservoirs and small water bodies. This provides a major protein diet to the people [3,11]. From nutritional point of view the macro and micronutrient present in fish are acceptable for human consumption [2].

A search of literature throughout revealed a lot of things that are related to the nutritional importance of fish in human health. This study aims to provide information of nutrients present in fish and its benefits to human health. Different nutrients present in fishes have unique and a very important function in the human health. The information in this paper is useful to help people to include fish in their diets based on its nutrient values. It can also help people to understand the benefits of eating fish. It can also make people aware of nutritional importance of fish in preventing various diseases. However, while fisheries in Nepal are becoming more documented, there still are gaps in research. Although there are a lot of benefits of consuming fish in our regular diets, people are unaware of these benefits. Thus, to understand these data gaps and to highlight the nutritional importance of fish in human health, we conduct a literature review to gain a clear understanding of the current status of the knowledge of fish nutrition in Nepal.

### 2.0. Biochemical Composition of Fish

Fish is known to have a lot of nutrients including micro and macro nutrients. The macro nutrients are proteins, lipids and a very little amount of carbohydrate. The micronutrients like Vitamins and Minerals are very important constituent as well. The importance of various nutrients available in fish is explained below.

Moisture	65-80%
Protein	15-20%
Fat	5-20%
Ash	0.5-2%

Source: (Mohanty, 2015)

#### 2.1. Protein

60% of people from developing countries depend upon fish for over 30% of their animal protein supplies [6]. The unit cost of production of fish as compared to other dietary protein source such as chicken, mutton, pork, beef, etc is much cheaper. Fish contains all the essential amino acids including sulphur-containing amino acids: cysteine and methionine which are absent in plant protein [3,12]. Fish is an important source of animal protein and provides greater satiety effect than other sources like chicken, beef, etc [3]. It is reported that the fish muscle is more digestible than other animal protein due to the presence of lower level connective tissue [13]. Amino acid concentration of fish and digestibility of fish proteins is high i.e. 85-95% [12]. Fish protein is mainly responsible for building and repairing muscle tissues, improving immunity and blood quality. Mohanty (2015) stated that fish being a potential source of animal protein, can play an important role in preventing protein-calorie malnutrition (PCM). The protein immunoglobins can act an important defense against bacterial and viral infections and helps in the maintenance of electrolyte and water balance in human system. The protein derived from fishes also balances many body regulatory factors [6].

#### 2.2. Fatty Acids

The composition of fatty acids in fish varies depending on factors such as species, diet and environmental factors like salinity, temperature, season,

geographical location and whether the fish is wild or farmed [14]. Fish lipid contains long chain n-3 poly unsaturated fatty acids (PUFA) particularly eicosapentaenoic acid (EPA) and docosahexanoic acid (DHA). PUFA in fishes is found in the liquid form which flows in the blood vessels freely and this makes it different from other fats or oils [15]. The intake of PUFA has been considered important in human nutrition, health and disease prevention [6]. The omega-3 fatty acids have various effects in the human health. It decreases the rate of myocardial infarction [16]. It lowers the blood pressure and triglyceride concentration in blood [17]. Fish lipids have shown a positive effect in preventing certain diseases like cardiovascular diseases [18]. Omega-3 fatty acids found in fatty fishes are known to be essential in the growth of children and prevent coronary heart disease [8]. The DHA is important for optimal brain and neurodevelopment in children and on the other hand EPA helps to improve the cardiovascular health [19]. Studies that assess the mechanisms of beneficial effects of fish lipids on health have shown that high levels of LC n-3 PUFA of at least 1 to 1.5 grams per day is required for the beneficial effects in reduction of risk of cardiovascular diseases such as reduction of plasma triacylglycerol levels, blood pressure, platelet aggregation and the inflammatory response [20]. During the pregnancy and lactation period, the mother should supply the fetus and infants with LC n-3 PUFA which is very essential for the development of the central nervous system [21]. Lipids and fatty acids also play an important role in membrane mediated process such as osmoregulation, nutrient assimilation and transport [6].

### 2.3. Minerals

Fish is an important source of micronutrients which are not widely available from other sources in the diets of poor people [22]. Compared to other minerals Ca absorption to body is insufficient. Only 25 to 30% of Ca is absorbed by our body [23]. Besides milk and milk product, fish and fish bones are a good source of Ca and it was shown that calcium absorption from fish is comparable to that of skimmed milk [19]. Ca is also important for bone density and calcium ions play role in most of the metabolic process. Fish is very rich in minerals like iodine and selenium [24]. Small Indigenous Species (SIS) which are consumed whole with heads and bones, can be an excellent source of many minerals such as iodine, selenium, zinc, iron, calcium, phosphorus and potassium [22]. Selenium is toxic in large doses to humans. But Selenium is important micronutrients for humans which functions in the form of selenoproteins as a cofactor for reducing the antioxidant enzymes, such as glutathione peroxidase. This is also responsible for the function of thyroid gland. Low levels of selenium can lead to risk of myocardial infarcts and increased death rate due to cardiovascular disease and has also been related with increased risk of cancer and renal disease [25]. Iron is an important component for the synthesis of hemoglobin in RBCs which helps to transport oxygen to all parts of the body. Deficiency of this mineral can cause anemia, impaired brain function and in infants it causes poor learning abilities and poor behavior [3].

### 2.4. Vitamins

The entire vitamins essential for human health is present in good amount in fish, but amount may vary according to the fish species [12]. Fish is a significant source of vitamin A and D, and several vitamins of B- group [22,26]. Many foods are deficient in vitamin D naturally and foods that are fortified with vitamin D is inadequate for a child's or adult's development [27]. Many species of fishes store large amount of vitamin A & D in their liver. Vitamin A helps for normal growth, formation of bones and teeth, building of cells and it also prevents the problem of poor eyesight and helps in the treatment of many eye diseases [12]. Vitamin D in fish is found in the form of vitamin D3 (Cholecalciferol) which is also the same form being produced in the skin from 7- dehydrocholesterol when exposed to ultra violet light and which was shown to have 3 times higher potential as compared to vitamin D (Ergocalciferol) [26, 28]. Vitamin D deficiency leads to rickets, osteomalacia, a low bone mineral density (BMD) and increased cases of falling in people [29]. It is also connected with diabetes [30]. Vitamin D deficiency exacerbates osteopenia, osteoporosis and fractures in adult. Fish and fish oils are the foods that contain Vitamin D naturally [27, 31, 32].

### 3.0. Discussion

Nutrition is a core pillar of human health. Fish is an important source of human nutrition. The nutrients present in fishes play a vital role in the health improvement of people as well as it prevents many diseases that are likely to occur. The nutrients like proteins, lipids, and micronutrients help in many ways to keep a human healthy. But there is still a lack of knowledge in the people about all the benefits of eating fishes. The government of Nepal has recommended 30g fish or animal protein diet per day. In Nepal still people are not aware of the nutritional and health benefits consuming fish. People still prefer meats like chicken, mutton, etc instead of fish. But if we can make them aware of the health benefits of the fish, the per capita consumption of fishes might be increased. Bogati N (2018) stated that, "The consumption of trout fishes can help reduce weight while retaining muscle mass and maintaining appetite also [37]." Fish is also important for a healthy heart and promotes the development of brain and eyes. Globally the fish per capita consumption has increased from 14.4kg in the 1990s and has crossed 20.3g in the 2016s [34]. But in Nepal it has been recorded only 1.97kg/year in 2010/2011 to 2.365kg in 2013/2014 [35]. But this is not fulfilled in national scenario. The communities like Tharu, Majhi, Lodh, Gupta, Kumal, Gahar, Gaud, etc in Nepal were firstly engaged in fish farming business. Now many communities are involved in this business but still there is no sufficient production of fishes to fulfill the demand of the people.

While considering fish as food rich in nutrients, n-3 PUFA is a major constituent such as EPA and DHA. This makes a person healthy and prevents a lot of diseases like cardiovascular diseases, lowers the blood pressure, neurodevelopment in child, etc. The demand of fish and fishery product is growing day by day due to the fact that it consists of plentiful of essential nutrients for the health of people [36]. Abundant freshwater resources originating from the Himalayas are one of the factors which might give positive opinions on the aquaculture promotion in Nepal [37].

### 4.0. Conclusion

Fish is an important source of nutrients as it provides a good balance of proteins, vitamins, fats, lipids, minerals, etc and has a very low caloric content. The nutritional value and health benefits of the fishes are unrecognized and undervalued. Despite a lot of benefits in the health of human, people are still unaware of those benefits. So, people should be made aware about the nutritional benefits of consuming fish. Comparative studies can be conducted between the benefits of meat and fish consumption in human health. This can enhance the consumption of fish due to high nutritional content recorded.

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