

Analysis of proximate nutrient content in some selected fish of Bangladesh

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Abstract

The study presents the content of moisture, fat, protein, ash and carbohydrate in some selected fish of Bangladesh. The study fishes include Ketchki fish (*Coria soborna*, Hamilton-Buchanan, 1822), Molafish (*Amblypharyngodon mola*, Hamilton-Buchanan, 1822), Poah fish (*Panna microdon*, Bleeker, 1842), Tilapiafish (*Oreochromis mossambic*, Peter, 1852), Silver carp fish (*Hypohthalmichthys molitrix*, Hamilton-Buchanan, 1822), Ruhi fish (*Labeo rohita*, Hamilton-Buchanan, 1822), Takhi fish (*Channa punctatus*, Bloch&Schneider, 1801), Pangas fish (*Pangasius pangasius*, Hamilton-Buchanan, 1822). The moisture content, in present study, was found to be in range of 71.9-80.73g%. Protein content was found in the range of 12.96-17.18g%. Ash content in the fish was found to be in range of 1.47-11.76g%. Fat content was found in the range of 1.4-11.76g%. Carbohydrate content in the fish was found to be in range of 1.04-3.5g%. Total calorie content in the fish was found to be in a range of 83.39-169.30 Kcal/100g.

Key Words: Fish, Carbohydrate, Protein, Fat and ash (total mineral) content.

Introduction

Rice and fish dominate the diet of Bangladeshis to such an extent that old proverb, "Mache Bhatee Bangali", which can be translated as "Fish and rice make a Bengali", continues to hold true. Fish is an essential and irreplaceable food in the rural Bangladeshi diet. Together with boiled rice, this is eaten at least twice per day, small amount of vegetables and fish make up the typical meal. Meat, pulses and fruits are eaten less frequently and a smaller amount. Rice contributed 80% of the dietary energy and protein¹. In terms of food weight of food consumed, fish ranks third after rice and vegetables. More recent regional studies have confirmed the importance of fish in the Bangladeshi diet^{1,2}. Fish intake affected by several factors, such as year, seasons, locations, water level and household income.

Small indigenous fish species, which are defined as species attaining a maximum length of 25 cm^{3,4}, contribute considerably to total fish intake. A study conducted in Mymensingh, Northern Bangladesh showed that fish intake increases with income⁵.

Fish provide main source of income to two million households that either fish for a profession or involve

in related trades⁶. Many more households catch fish for a part time income and food. In communities with access to fisheries, studied by International Center for Living and Aquatic Resources Management, shows the estimation of 87% households caught fish in some part of the year⁷.

Methods and materials

Collection of samples

Big and small fish were purchased from local markets in Dhaka city as fresh as possible. Fishes were collected during the months of September 2009 - October 2009. The fish selected for the study are Ketchki fish (*Coria soborna*, Hamilton-Buchanan, 1822), Molafish (*Amblypharyngodon mola*, Hamilton - Buchanan, 1822), Poah fish (*Panna microdon*, Bleeker, 1842), Tilapia fish (*Oreochromis mossambic*, Peter, 1852), Silvercarp fish (*Hypohthalmichthys molitrix*, Hamilton-Buchanan, 1822), Ruhi fish (*Labeo rohita*, Hamilton-Buchanan, 1822), Takhi fish (*Channa punctatus*, Bloch&Schneider, 1801), Pangasfish (*Pangasius pangasius*, Hamilton-Buchanan, 1822). They were prioritized, because they enjoy a good popularity amongst the people of Bangladesh.

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Identification

The fish were identified with local and scientific names¹⁸.

Sampling

Immediately after procurement from the market, all fish were washed with distilled water and the surface water was drained out. Weight of the fish was recorded as purchased. They were then processed in usual practice. The scales, fins and viscera were removed and separated. Fishes were then filleted from both sides. The processed study fishes were then washed with de-ionized water. The whole processed fish was then dissected and each portion was de-boned as completely as possible and the edible portion for each region was separated and minced in a mechanical grinder. Two gram samples in duplicate from each portion were taken for the determination of moisture. Rest of minced sample was collected as completely as possible, wet weight was recorded and the sample was dried in an oven at 105°C. The weight for dry sample was recorded. The dry sample was then ground in a mechanical grinder. Nutrient analysis was accomplished in dry sample and the values were later readjusted for wet weight.

Analytical techniques

Moisture, total lipids and ash (total mineral) were determined by following the standard AOAC method³. Crude protein was determined by modified Kjeldhal method⁴. Available carbohydrate was estimated indirectly by difference⁵. Total energy was also determined by the calculation of energy values of carbohydrate, fat, protein and crude fiber⁵. Fat was determined according to the modified method described by Folch et al³. Anhydrous chloroform-methanol mixture in the ratio of (2:1) was used to extract the fat from the dry samples. Total Ash is estimated by following established method for accuracy the estimation process was repeated until a constant weight was obtained and the ash became almost white and grayish in color.

Statistical analysis

Mean, S.E. (Standard error) were determined for all

nutrients under present study. Statistical analysis was accomplished by using Statistical Package for Social Sciences (SPSS/PC; Version12.0; SPSS Inc., Chicago).

Results and Discussion

Fish contributes a major share of animal foods in our traditional Bangladeshi diet and provides access to the essential macro and micronutrients, in which our habitual diet is grossly deficient. In the present study, eight Bangladeshi fish such as Kachki, Mola, Poa, Tilapia, Silver carp, Ruhi, Taki and Pangas were selected for analysis. The present study depicts the content of fat, protein, carbohydrate, ash, moisture and calorie in these eight fish. They have been prioritized for analysis because they enjoy a great measure of popularity; and thus, they are consumed on a large scale in Bangladesh. In the present study, analysis of the nutrient was carried out only for the edible portion of the fish. Moisture content in the present study is in good agreement with the values reported in all these previous studies⁸⁻¹⁰. Moisture content of fish depends on some factors such as season, sex, age etc. Venkataraman and Chari made a thorough investigation on the seasonal variation in chemical composition of Mackerel and found that moisture and fat were subject to seasonal variation¹¹. A study with *cirrhinus mrigala*, reported that nutrient content varied due to the variation of habitat and physiological condition¹². The depleted fish (after spawning) contained higher amount of moisture and lower amount of fat and protein than the spawning ones. In the same study on *cirrhinus mrigala* (Ham), larger fish was found to contain lower amount of moisture than the smaller ones¹². The moisture content of big fish (Ruee, Katla, Mrigal, Silver carp, Hilsha) was found to be in a range of (43.69-74.33%)⁴. In another study, the moisture content of big fish (Aeir, Boal, Coral, Kalabaush and Shol) was found to be in a range of (77.66-81.95%)⁵. Our values (73.92-80.73 g %) are in good agreement with their values.

Protein content in fish was reported to be in a range of 13-22 g%^{1,9}. In another study, protein content of fresh water fish was demonstrated to be 15-18 g%^{1,5}. Govindan also demonstrated a range of 9-25 g% protein for fresh water and marine fish¹³. Protein content of fish, as revealed in the present study, is in good agreement with the values reported in these

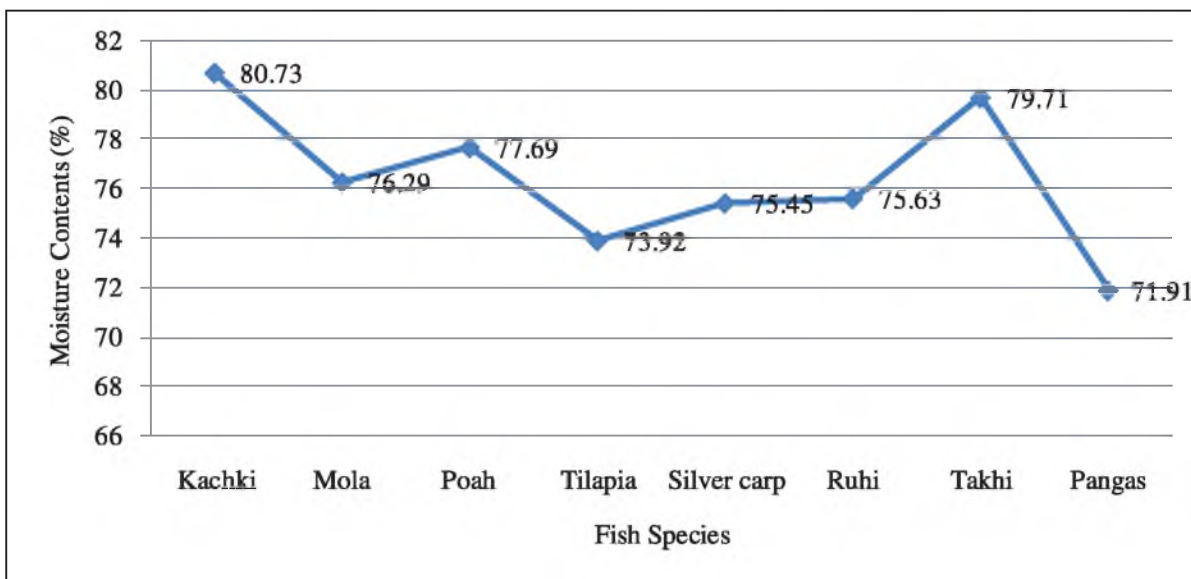
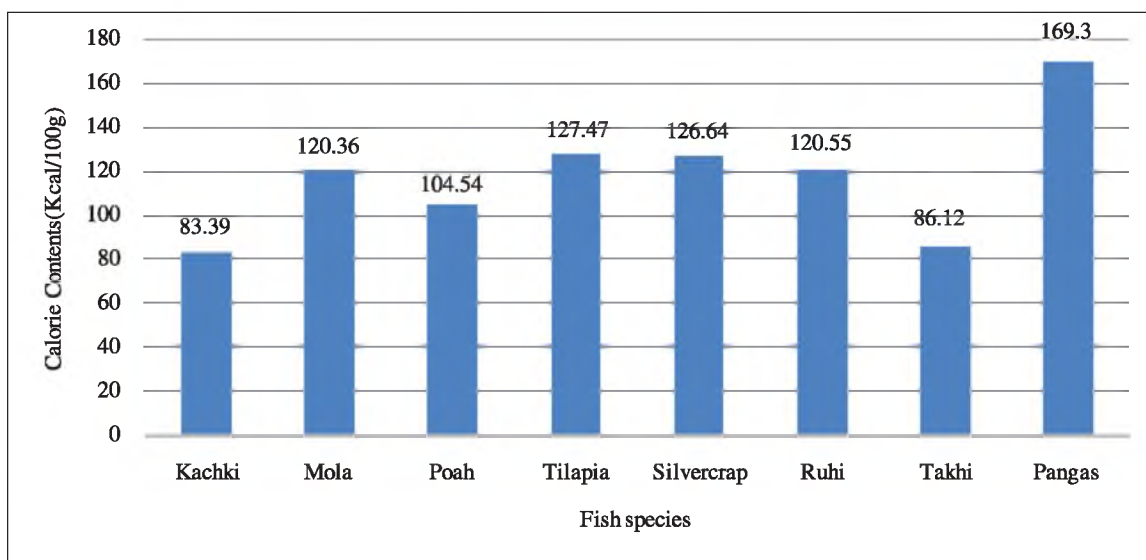


Figure-1: Mean (\pm S.E.) Content of moisture in studied fish sample.



Values are expressed in terms of wet weight and gram per 100g edible portion

Figure-2: Mean (\pm SE) calorie content of selected fishes.

studies. Protein content is subject to variation due to the variation of factors such as size, sex, habitat, physiological condition and also season. In a previous study, protein content of big fish (Ruee, Katla, Mrigal, Silver crap, Hilsha) was found to be in a range of (17.52-23.14 g%)^{10,13}. Munira demonstrated the protein content of big fish (Aeir, Boal, Coral,

Kalabause, Shol) to be in a range of (16.65-21.10 g%)^{5,9}. All these previous studies suggest a wide range (9-25 g%) for protein to be present in this fish^{8,10,13}. Our values (12.96- 17.18 g%) are in good agreement with their values.

Fish can be divided into different categories on the

Table 1: Proximate nutrient content (Mean ± SE) of selected fishes

Local name	Name of Fish Scientific Name	Total Ash (g/100g fresh sample) Mean±S.E.	Total Protein (g/100g fresh sample) Mean±S.E.	Total fat (g/100g fresh sample) Mean±S.E.	Available carbohydrates (g/100g fresh sample) Mean±S.E.
Kachki	<i>Coria soborna</i> ,	1.09±0.084	12.99±0.073	2.13±0.063	3.06±0.180
Mola	<i>Amblypharyngodon mola</i>	1.61±0.063	12.96±0.127	6.39±0.035	2.75±0.338
Poah	<i>Panna microdon</i>	0.51±0.016	15.52±0.261	3.46±0.078	2.82±0.113
Tilapia	<i>Oreochromis mossambic</i>	0.59±0.014	16.87±0.302	5.11±0.082	3.50±0.192
Silvercup	<i>Hypohthalmichthys molitrix</i>	0.52±0.027	14.59±0.170	6.10±0.122	3.34±0.191
Ruhi	<i>Labeo rohita</i>	0.57±0.064	15.60±0.382	5.07±0.104	3.12±0.9
Takhi	<i>Channa punctatus</i>	0.60±0.023	17.18±0.930	1.47±0.023	1.04±0.975
Pangas	<i>Pangasius pangasius</i>	0.47±0.013	13.71±0.094	11.76±0.208	2.15±1.760

basis of the fat content – low fat (5g %), moderate fat (5-10 g %), high fat (> 10g %). This way, Kachki, Poa and Taki may be considered as low- fat fish, Mola, Telapia, Silver carp and Ruee as moderate- fat fish, while Pangas may be considered as high- fat fish. Stanbyet. al, (1963) investigated the fat content of fresh-water fish and reported that fat content varied between 0.8-15.9 g% with an average of 2.9g%⁹. Rubbi at el (1987), reported the fat content of twenty-seven species of fresh water fish in Bangladesh⁸. In their study, fat content varied between 0.89-15.11 g%⁸. Thus, fat content in the present study, is very much within the range reported in these previous studies^{10,14}. Fat content of fish comprises a complex mixture of glycerides, polar-lipids (phospholipids) and lesser components (sterols, sterol ester, free fatty acids etc.). The proportions of each again are dependent on species and seasons¹⁵. Total lipid concentration differs due to size of fish, portions of fish, time of fish catch, water temperature as well as seasons¹⁶. Total lipid content in different portions of various sizes of Hilsha fish was demonstrated by Gomez at el, and they reported that ventral part of fish contains more fat content than the dorsal part irrespective of size and season¹⁷. In the present study, total ash content of the selected fish was found to be in a range of 0.47g% for Pangas and 1.61g% for Mola.

Total Ash content was relatively high (1.09g%) for Kachki, whilst the total ash content of the other fish ranges from 0.51g% to 0.6g%. Total calorie content of different types of fish in the present study was found to be in the range of 83.39 Kcal/100g for Kachki and 169.3 Kcal/100g for Pangas. The calorie content of Pangas seems to be higher than that of other fishes. The reason might be higher content of fat in Pangas. The calorie content of Mola, Rui, Silvercup and Telapia are relatively high.

Conclusion:

Fish has been widely accepted as one of the most important sources of animal protein. And other elements for the maintenance of healthy body. They have a significant role in nutrition, income, employment and foreign exchange earning of the country. Fish and Shellfish are the primary sources of animal protein and valuable in the diet because they provide a good quality of protein of high biological value, particularly essential amino acids. So, the findings of the present study can play an important role to help identify good fish sources for mineral, fat, protein and carbohydrate in our diet. It will be of immense help in updating the “Food Composition Table” in Bangladesh.

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