Comparative analysis of protein, moisture, ash and fat profile of 4 common fish of upper Ganga

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Abstract
A comparative study on the content of Protein, moisture, ash and fat four Indian fishes *Schizothorax plagiostomus, Cyprinus carpio specularis, Cyprinus carpio communis, Catla-catla* were carried out in the present study. The proximate analysis revealed that the protein content of *Schizothorax plagiostomus, Cyprinus carpio specularis, Cyprinus carpio communis, Catla-catla* 15.51**%,**13.93%,16.9%,18.79% (% of wet weight), respectively. The total fat content was generally high, ranging from 3.58% to 19.56 % and ash ranged from 1.31% to 2.8 %. Moisture content varies from 78.06% to 65.83%. This result evidently shows that the importance of fish nutrition in the human diet for fighting the diseases like heart problems, cholesterol and many growth related problems.

Keywords: Protein, *Schizothorax plagiostomus, Cyprinus carpio specularis, Cyprinus carpio communis, Catla-catla*

Introduction
Fish, it is a world-wide distributed food commodity. It is observed as a potentially a cheap source of protein, especially greater significance to developing countries like India, where problems of nutritional deficits persist. As an ironic source of nutrient, fishes provide a good equilibrium of protein, vitamins and minerals and relatively low caloric content [1]. The fat content in fish varies, but most fish species eaten by us have comparatively low fat content and a high percentage of protein. Fish, especially a liver oils is rich in vitamins A and D. No wonder that as little as 120gm of fish will serve about half our daily need for protein. Fishes content vitamin B6 and B12, which help in producing red blood cells, antibodies and maintain the central nervous system. Fish can, therefore, form part of our balance diet to provide any nutrients need by the human body. Conventional fin fishes and seafood potentially provide from 420-840KJ/100g, against the average daily requirement of energy of an adult doing normal work. Fishes are source of good quality protein that we can easily and completely digest. In addition, fishes are excellent sources of polyunsaturated fatty acids that appear to have beneficial Affects in reducing the risk of cardio vascular diseases [2] and are linked with curing certain types of cancer. Fishes are known to provide several nutritional and therapeutic benefits for health problems [3] like coronary heart disease, hypertension, obesity [4], and osteoporosis and iron deficiency [5]. The main objective of this study was to determine the fatty acids profile and composition (percentages) of four species *Schizothorax plagiostomus, Cyprinus carpio specularis, Cyprinus carpio communis, Catla-catla*. These species are selected for the study because of their economic importance and consumer demand in the Indian aquaculture. Therefore, detailed information about their fatty acids composition was important from nutritional point of view and was needed because it influenced the quality in frozen storage of some fish species. Thus; this study was carried out to evaluate the lipid content and fatty acid profile of commercially important fresh water fishes from Indian waters.

Sample Collection
Four of fresh water fishes were collected *Schizothorax plagiostomus, Cyprinus carpio specularis, Cyprinus carpio communis, Catla-catla.* Four samples of similar body weight and length for all analyzed fish species were collected from fish market located at Dehradun, India. Prior to analysis, about 25 gm of fish muscle tissue was separated for the determination of protein moisture, ash and fat composition.

Methods
The following parameters were determined for above mentioned fishes which include moisture, protein, fat, ash and NFE by using the standard methods (AOAC, 1995).

Methods used for determination of moisture content
For determining the moisture content of fishes, the body of each fish was divided into two horizontal regions along the lateral line i.e. dorsal and ventral parts and samples were taken. Simultaneously the uniform proportion of the sample was also collected from all the parts of the individual fish for the determination of whole body moisture content of the fishes. The wet samples were put in pre-weight dry petridishes and then weighted again. The petridishes with wet samples were kept in hot air oven for drying at 105°C for about 24 hours or until the constant weight was obtained. Then dry samples were taken out from oven and put in desiccators, after 30 minutes the weight was taken, the difference in weight (wet and dry sample) was calculated and expressed as percentage moisture content of the sample [6]. The percentage of moisture content was calculated by using the following formulae:

$$\text{Moisture (\%)} = \frac{\text{Wet weight of sample (g) - Dry weight of sample (g)}}{\text{Wet weight of sample (g)}} \times 100$$

The moisture free dried fish samples were grinded and finely powdered with the help of mortar and pestle for converting samples into fine powder which was used for the analysis of other parameters.

Protein

The technique employed for the estimation of crude protein content was based on slightly modifying micro-Kjeldahl's method (Jafri *et al.*, 1964) 0.1–0.5 gm of sample was digested with 1:1 sulphuric acid in presence of potassium persulphate as an oxidizing agent. After complete digestion the sample was transferred in 50 ml volumetric flask and raised the volume upto 50 ml by adding double distilled water. 0.5 ml of aliquot was then taken in a test tube with Nesseler's reagent, after 10 minutes the colour developed was read on spectrophotometer at 480 nm. The optical density (OD) obtained is used for estimating the crude protein ($N \times 6.25$) content of the sample [7].

Fat

Crude fat content of sample was determined by using solvent extraction technique with petroleum ether (B.P- 40-60 °C) by using Soxhlet apparatus (Foss Avanti Automatic 2050, Swedan). Briefly 1-5 gm of dried fined powdered sample is placed in Whatman Thimble and defatted cotton is plugged on the top of the thimbles. These thimbles then put into the thimble holder and placed inside the machine i.e. attached with condenser. The aluminium made extraction cups were first dried and weighted. Then added 60-70ml of petroleum ether and finally attached with thimbles already placed inside the machine. After full programming the extraction process gets started and then completing the whole extraction process, the equipment display a message that extraction is completed. Then the extraction cup containing fat content was removed from the extraction unit and placed in digital oven for about 60 minutes at 50-60 °C for the complete evaporation of petroleum ether, later on the aluminium cups containing samples were placed in desiccators for complete coolness and finally the weight was taken [8].

The total fat was calculated by using following formulae:

$$\text{Total fat (\%)} = \frac{\text{Weight of fat (g)}}{\text{Wet weight of sample (g)}} \times 100$$

Weight of fat= Weight of extraction cup with fat- Weight of empty extraction cup.

Total Ash

The ash content of the sample is the residue left after complete ashing. The fine powdered moisture free samples were taken in clean pre-weighted silica crucibles and weighted again along with samples. The crucibles containing samples was then placed in a muffle furnace at 650°C for about 4-6 hours or till the residue became completely white. The samples were then allowed to cool in desiccators for about 20-30 minutes, reweighted and the amount of ash was calculated as the difference in weight. The percentage of ash was obtained by using the following formulae:

$$\text{Total ash (\%)} = \frac{\text{Weight of ash (g)}}{\text{Weight of sample (g)}} \times 100$$

Weight of ash= weight of crucible with ashed sample - weight of empty crucible.

Results and Discussion

Table 1

Body Constitutes	*Schizothorax plagiostomus*	*Cyprinus carpio specularis*	*Cyprinus carpio communis*	*Catla-catla*
Moisture (%)	74.27	78.06	77.14	65.83
Protein (%)	15.51	13.93	16.9	18.79
Fat (%)	3.75	3.9	3.58	19.56
Ash	2.8	2.9	2.8	1.31

Moisture

Results visibly indicated a marked variation of moisture in all the four fish species. The present content of all the species in the present studies varies from 78.06 to 65.83 as shown in table above. Among all the species studied the *Cyprinus carpio specularis* has the maximum moisture content 78.06 which was significantly higher among all the fish species analyzed in the present species on the other hand *Catla-catla* had the minimum moisture content of 65.83.

Protein

Results visibly indicated a marked variation of protein in all the four fish species. The present content of all the species in the present studies varies from 13.93% to 18.73% as shown in above table. Among all the species studied the *Catla-catla* has the maximum protein content 18.73% which was significantly higher among all the fish species analyzed in the present species on the other hand *Cyprinus carpio specularis* had the minimum protein content of 13.93 [9].

Fat

In present research, Fat content varies in different fish species. Fat content reported within range of 3.58% - 19.53%. The fishes of river Ganga have highest Fat content 19.53 of *Catla-catla* and lowest fat content of 3.58% by *C. carpio communis* [10].

Ash

The ash content of the sample is the residue left after complete ashing [11]. The values obtained for the ash content in the body of different fish species varied within the range

of 1.31-2.9

Conclusion
The nutritional value of fish and fish protein has attracted a lot of public attention. It is believed to have many protective effects to various long-lasting diseases such as arteriosclerosis, coronary heart diseases (CHD) and many other diseases [12]. Fishes are source of good quality protein that we can simply and completely digest. In addition, fishes are outstanding sources of omega-3 that appear to have beneficial Affects in anti-aging skin treatment [13]. Fishes are known to provide several nutritional and therapeutic benefits for health problems like coronary heart disease, hypertension, obesity, and osteoporosis and iron deficiency [14]. From the present study clearly shows that all the selected Indian fishes for this study has favourable amount of protein and fats which are very much known to avoid all sorts of diseases [15].

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