

Studies on the biochemical composition of Indian carps

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“STUDIES ON THE BIOCHEMICAL COMPOSITION OF INDIAN CARPS”

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ABSTRACT

In this experiment we study the important biochemical composition like Carbohydrate , Protein, Lipid and Moisture content, were estimated in muscle tissues of experimental fishes such as *Catla catla* (Ham), *Hypophthalmichthys molitrix* (Silver carp), *Cirrhinus reba* (reba), *Labeo calbasu* (calbasu) were collected from fish market in kumbakonam. The study reveals that the percentage of water content was more in Calbasu and less in *Catla catla*. The range of water content is 76.00 to 81.50 %. Protein content was more in *Catla catla* and less in Reba. The range of protein content is 78 to 196.04%.The range of carbohydrate content is 13.23 to 21.42%. Carbohydrate analysis shows more in Silver carp and less in Calbasu. The protein content is very high than compared with carbohydrate and lipid. The percentage of lipid content ranged from 0.38 to 0.73%. The minimum value of 0.38 % found in reba and maximum value of 0.73% found in *Catla catla*. The present study suggested that the biochemical composition of fishes depend up on the age, size and feeding habit of the fish. The protein level were found to be more in medium size group in all experimental fishes and *Catla catla* ranked as one. Hence the fishes of medium size group are more suitable for consumption. Protein was used for body building during different phases of maturation.

KEY WORDS

Catla catla (Ham), *Hypophthalmichthys molitrix* (Silver carp), *Cirrhinus Reba* (reba), *Labeocalbasu* (calbasu), Protein, Carbohydrate, Lipid.

INTRODUCTION

Water is a transparent fluid which from the world's streams, lakes, oceans, and rain, is the major constituent of the fluids of living thing. Only 25% of the earth's water is fresh water and 98.8% of that water is in ice and ground water less than 0.3% of all fresh water is in rivers, lakes, and atmosphere, and an even smaller amount of the earth's fresh water (0.003) is contains with in biological bodies and manufactured products.(srivastava,1999). Fresh water aquaculture is dynamic and fast growing sector in south Asia. Fish culture has helped millions of farmers in improving their food and nutrition security. (Talwar and Jhingran, 1991) The characteristics of small pond size, lively hood dependence and poverty among the fish farmers are shared by most of the SAARC nations. Hence aquaculture development in the region needs to be more oriented towards supporting the small scale aquaculture. (Grover *et al.*, 2002) In aquaculture sector , good brood-fish is prime source of quality seed to ensure good national and regional fish production. Fisheries to employment, lively hood and food security. Fish products also from a significant commodity for overseas trade. (Hannah *et al.*, 2009).During the past decades the Indian fisheries and aquaculture has witnessed improvements in aquaculture technologies, capture fisheries and overall quality improvement (Trachoo *et al.*, 2006). Ponds and tanks are the prime resource for fresh water aquaculture, however only about 0.8-0.9 million has used for aquaculture.In India the majority of the people were affected by the deficiency of protein in their food. (Mridha, 2005). malnutrition increases the risk of infection and infectious disease and moderate malnutrition weakens every part of the immune system. Malnutrition affects HIV transmission by increasing the risk of transmission from to child and also increasing replication of the virus(Nowsad, 2007). The fish and fishery products are the chief sources of protein. Our protein demand can be compensated only by fishery products. (Tidwell *et al.*, 2005). The fishery products include both and shell fishes of fresh water and marine water. Fish provides a good sources of high quality protein and contains many vitamins minerals. The nutrients and minerals in fish and particularly the omega 3-fatty acids found in pelagic fishes. (Edirisinghe, 1998), Fish contain poly unsaturated fatty acids which are known to protection against cardio vascular diseases. Fish protein comprise all the nine essential amino acids (histidine, arginine, leucine, isoleucine, Lysine, methionine, phenylalanine, threonine, tryptophan, and valine) This accounts for the high biological value and protein efficiency ratio of fish fresh than other fish food like

meat. The role of aquaculture in increasing protein consumption in the world depends on demand. Food is composed chiefly of carbohydrates, fats, protein, water, vitamins and minerals. Food energy is derived from carbohydrates, fats and protein as well as organic acids, polyols, and ethanol present in the diet. The human body uses the energy released by respiration for a wide range of purposes about 20% of the energy is used for brain metabolic requirement of other organs and tissue.. protein is the major (Bamikole *et al.* 2005) structural component of all cells in the body. Hence it is considered the fundamental unit of growth. It functions as enzymes and hormones and is needed for the production of neurotransmitters, vitamins, antibodies and other important molecules (Bairagi *et al.*,2005).The majority of fish farmers are culturing predominantly the Indian major carps such as *Catla catla* (Ham), *Hypophthalmichthys molitrix* (Silver carp), *Cirrhinus reba* (reba), *Labeo calbasu* (calbasu) .The physico-chemical parameters influence the growth, metabolism, biochemical composition of fishes. Fishes are valuable sources of high grade protein and other organic products. (Abdullahi *et al.*, 2001). They are most important source of animal protein and have been widely accepted as a good source of protein and other elements for the maintenance of healthy body (Rahman, 1997)

MATERIALS AND METHODS

Sample of *Catla catla*, Silver carps, Reba, and Calbasu were collected from fish market in Kumbakonam. The specimens were properly cleaned in the laboratory and the total length and weight were determined. The fish muscle was taken to separate petridishes, from the tissues biochemical analysis of protein, carbohydrate and lipid were estimated. The tissues were kept in hot air oven at 60%. Care was taken to dry the tissues uniformly. The dried samples were finely powdered using mortar and pestle. Biochemical analyses for protein, carbohydrate, lipid, were carried out using standard methods .Protein was estimated by the method of (Lowry *et al.*, 1951.) Total carbohydrate content was estimated by the phenol sulphuric acid method (Dubois *et al.*,1956,). Lipid was estimated by the Floch method (Floch's *et al.*,1957)

BIOCHEMICAL ANALYSIS

ESTIMATION OF WATER CONTENT

The percentage of water content was calculated based on the difference between wet weight and dry weight of the tissues.

Calculation:

$$\text{Moisture} = \frac{\text{Fresh weight} - \text{Dry weight}}{\text{Fresh weight}} \times 100$$

ESTIMATION OF PROTEIN CONTENT

Protein content was determined by the method of *Lowry*.

Reagents and chemicals required

Bovine serum albumin, Ova albumin, Sodium carbonate, Folin's reagent, Copper reagent, Folin's reagent.

PROCEDURE

Get the fish from the market and Wash the fish with running water to remove its slimy secretion. Then Weigh the fish with the help of weighing balance and also note down its total length. Dissect the fish and take out the internal organs, muscle and then homogenize the organs with the help of homogenizer. After homogenizing centrifuge at 10,000 r.p.m for 20 minutes. Carefully take out the supernatant in the new test tubes and sample solution is ready which is to be further chemically analyzed. In case of sample solution we have to make 10 times dilution and 100 times dilution. For 10 times dilution pipette out 1 ml of sample solution and add 9 ml of distilled water. In 100 times dilution pipette out 1 ml of 10 times dilution and add 9 ml of distilled water. From 10 times dilution pipette out 0.3 ml in different test tube A and B and 0.8 ml from 100 times dilution in test tube C and Add 0.7, 0.7, 0.2, and 0.2 ml of distilled water respectively to each test tube to make volume up to 1 ml and add 5 ml of copper reagent to each test tube. Incubate at room temperature for ten minutes then Shake Well and add 1 ml of Folin's reagent to each test tube. Finally incubate at room temperature for 30 minutes and read absorbance at 620 nm.

Calculation

$$\text{Percentage of protein content} = \frac{\text{Mg of protein in the sample}}{\text{Weight of the sample}} \times 100$$

ESTIMATION OF CARBOHYDRATE CONTENT

Total carbohydrate content is determined by Phenosulphuric acid method

Reagents and chemical Required

5% Phenol, Glucose, Sulphuric acid, distilled water.

PROCEDURE

The fish muscle were collected homogenize in a homogenizer for about 5 minutes Then filter homogenate through cheese cloth In each case sieve out the homogenate and centrifuge it at 10000 rpm for 20 minutes. After centrifugation take the supernatant and discard the residue. Pipette out 0.5 ad 1 ml of sample solution in separate test tubes. and add 0.5 ml of distilled Water in first test tube to make up the volume to 1 ml. Now add 5 ml of H₂SO₄ in each test tube and incubate the contents at room temperature with vigorous shaking for 40 minutes. then Add 1 ml of phenol to each test tube and Read the absorbance in colorimeter at 490 nm.

Calculation

$$\text{Percentage of the carbohydrate content} = \frac{\text{mg of carbohydrate in the sample}}{\text{Weight of the sample}} \times 100$$

ESTIMATION OF LIPID CONTENT

Total lipid content is determined by Folch's method

Reagent and chemical Required

Concentrated Sulphuric acid, Phosphovanillin reagent, Olive oli.

PROCEDURE

The fish muscles were collected s homogenize in a homogenizer for about 5 minutes then filter the homogenate through cheese cloth and heat until a dry mass is left. Then Add di-ethyl ether to the extract in the ratio of 1:10 Now centrifuge the extract at 6000 r.p.m for 15 minutes and take

out the supernatant in tubes and let it settle for some time. Pipette out the liquid from the tubes with the help of micropipette and let the fat content to settle at the bottom which is further chemical analyzed supernatant was immediately stored in refrigerator for further chemical analyzed.

Calculation

$$\text{Percentage of the lipid content} = \frac{\text{mg of lipid in the sample}}{\text{Weight of the sample}} \times 100$$

RESULT

In this experiment we study the important biochemical composition like Carbohydrate , Protein , Lipid and Moisture content, were estimated in muscle tissues of experimental fishes such as *Catla catla* (Ham), *Hypophthalmichthys molitrix* (Silver carp), *Cirrhinus reba* (reba), *Labeo calbasu* (calbasu) were collected from fish market in kumbakonam. The study reveals that the percentage of water content was more in Calbasu and less in Catla catla. The range of water content is 76.00 to 81.50 %. Protein content was more in Catla catla and less in Reba. The range of protein content is 78 to 196.04%. The range of carbohydrate content is 13.23 to 21.42%. Carbohydrate analysis shows more in Silver carp and less in Calbasu. The protein content is very high than compared with carbohydrate and lipid. The percentage of lipid content ranged from 0.38 to 0.73%. The minimum value of 0.38 % found in reba and maximum value of 0.73% found in Catla catla.

TABLE-1**ANALYSIS OF PERCENTAGE VARIATIONS IN WATER CONTENT AND
BIOCHEMICAL COMPOSITION OF CULTURABLE FRESH WATER FISHES**

S.NO	Name of the fish	Size in grams	% of water content	% of protein content	% of carbohydrate content	% of lipid content
1.	Catla	120	76.00	196.04	16.32	0.73
2.	Silver	120	78.39	133.09	21.42	0.51
3.	Reba	120	79.98	78.00	17.28	0.38
4.	calbasu	120	81.50	92.02	13.23	0.49

Fig.1.percentage variation in water content of culturable fresh water fishes

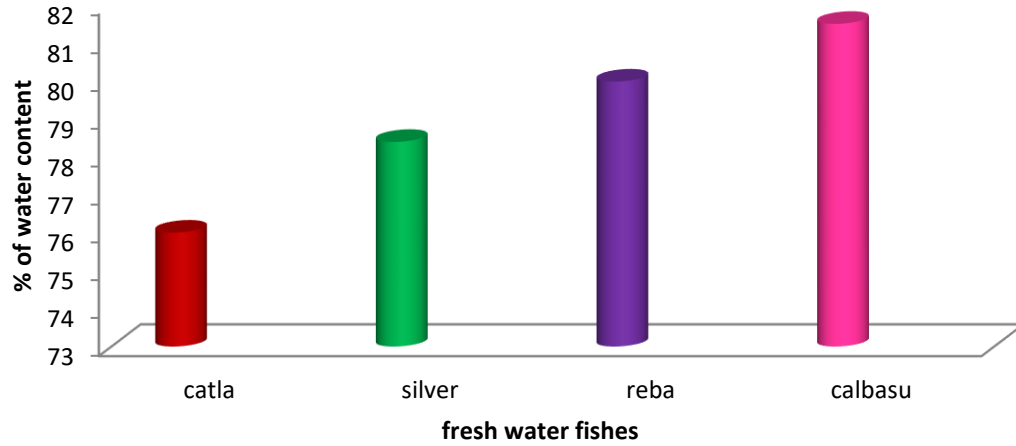


Fig .2.percentage variations in protein content of culturable fresh water fishes

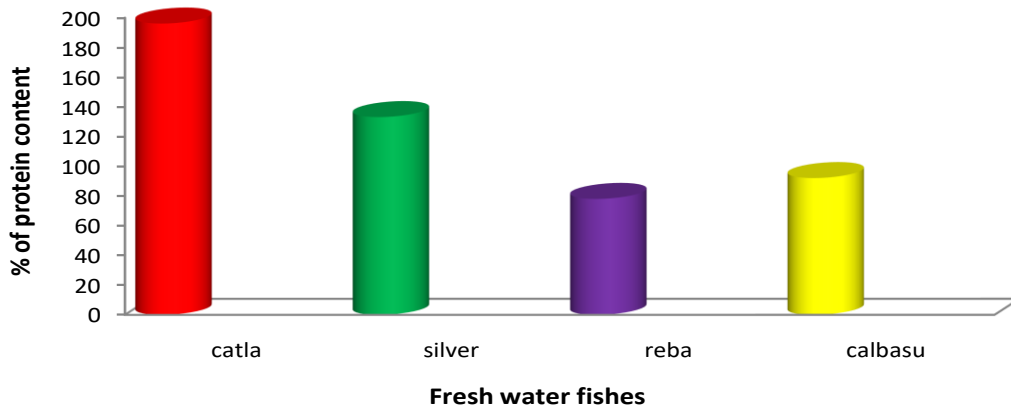


Fig .3.percentage variations in carbohydrate content of culturable fresh water fishes

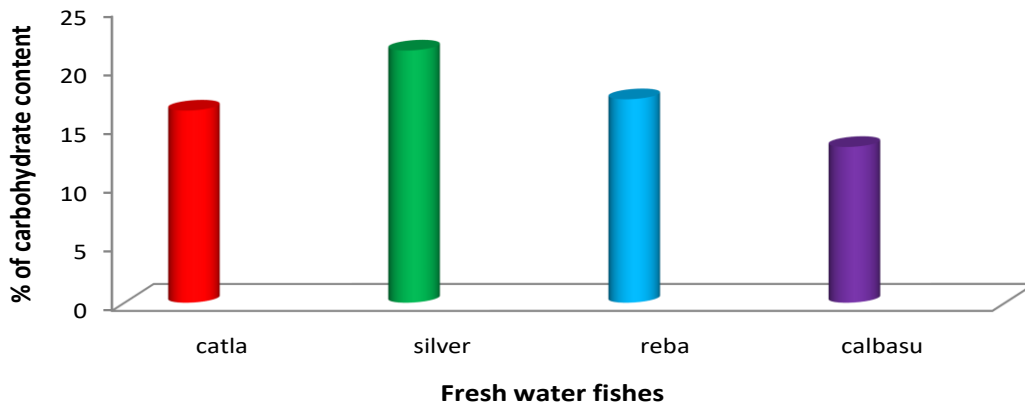
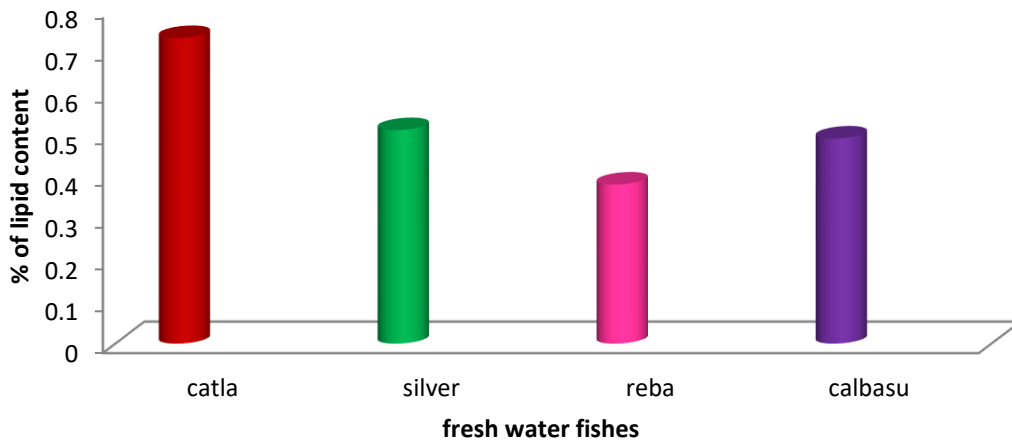


Fig.4.percentage variations in lipid content of culturable fresh water fishes



DISCUSSION

Four common food fishes were chosen and their biochemical composition and water content were analyzed. The study reveals that the percentage of water content was more in

Calbasu and less in Catla . The range of water content is 76.00 to 81.50 percent wet weight. Protein content was more in Catla catla and less in Reba. Fishes shows around the highest content of protein. The same results were observed earlier, which confirm this results.(Roberts and Vidthayanon 1991). Carbohydrate analysis shows more in Silver carp and less in Calbasu. The lipid content was more in Catla catla and less in reba. The protein content is very high than the compared with carbohydrate and lipid. The present study agrees with early observations (DoF, 2010) was investigated that the effect of dietary protein and lipid levels on growth, survival, and feed conversion of Indian major carp Catla Catla , Total biochemical composition of fresh water major carps Labeo rohita (rohu) Catla Catla (Ham) , Cirrhinus mrigala (mrigal), in relation to size was evaluated. (Bligh and Dryer, 1999)From present study , higher protein all most the four fishes were observed. There fishes can be consumption. Because of higher carbohydrate content, dialectics person can avoid more conception of Catla catla . They can very well use Reba due to laser carbohydrate and lipid content and higher protein. The present study suggested that the biochemical composition Protein, Carbohydrate, Lipid of the four fishes depends on age size and feeding habit of the fish. The protein level were found medium size group of all fishes. hence the fishes of medium size group is more suitable consumption.

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