Comparative Analysis of Nutritional value of Catla Catla And Labeo Rohita from different lakes of Coimbatore, Tamilnadu, India

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Abstract: The present investigation has been undertaken to analyse the nutritional profiling of selected same fish species such as *Catla catla, Labeo rohita,* collected from three different lakes which receive more anthropogenic pressures, in Coimbatore city, Tamilnadu, South India. Fish samples were ranged from 10.5 to 14.00 cm in length and 18.5 to 56.5 gm weight. The range of percentage of, moisture, ash, protein, carbohydrate, lipid and energy levels were 75.4 – 88.35, 92.76 – 94.79, 18.88 – 22.6, 0.94 – 2.92, 6.73 – 11.51 g/100g and 111.27 – 303.02 cal/100gm respectively. It was noteworthy that higher moisture percentage was observed (88.35%) in *C. catla* collected from Perur lake. A proximate composition such as protein, carbohydrate and lipid indicated were not species-specific and reflects the influence of the contaminated water body. The conversion energy level of selected fish species showed as *Catla catla>Labeo rohita* Obtained results were discussed in light of the quality of water in the lake and suitability of chosen Pisces for diet.

Key Words: *Catla catla, Labeo rohita, fish tissue,* Coimbatore lakes, proximate composition.

Introduction

Pisces are well known for their excellent unique, nutritional compositions including vitamins, and are widely used as a primary source of animal protein and other nutritional profile benefits for human health (Hantoush *et al*., 2014, Reza et al., 2015, Mazrough *et al*., 2015; Longwe and Fannuel *et al.,* 2016). The biochemical composition and their nutritive profile have played a crucial role in fish processing due to its effects both on quality and advanced biotechnology (Farid *et al*., 2014). Various investigations emphasized that fish eaters have relatively low susceptibility to many chronic disorders including heart diseases, atherosclerosis, and myocardial infarction (Blanchet *et al*., 2000). Fish is recognized as an energy depot and possesses several kinds of lipid that influence the proximate profile of whole fish and indicates its quality. Fluctuations in the biochemical composition of fish flesh are closely associated with the intake of feed

(Oyelese *et al*., 2006). The limit of moisture content in the composition is a good indicator for relative protein, carbohydrate, lipid content and energy. A low percentage of water content is related to the great energy density of the fish was reported (Aberoumad and Pourshafi *et al*., 2010).

The dynamic nutritional profile of fish, used as an excellent diet, fluctuates its content widely from species to species or the same species (Mohamed *et al*., 2013). Seasonality, fertility and feeding affect the nutritional profile of fish was reported (Akinneye *et al*., 2010). Nutrient quality level variations were due to fluctuations that occurred in the environmental factors and water quality parameters (Lagahari *et al*., 2018) Protein content of the fish offers a rich source of amino acids. Several under-developed countries facing a deficit of enormous vital protein and amino acids in their diet (Eyo *et al*., 2001). It was often noticed that while water content percentage is low, fat and protein content would appear high in fish muscle as energy stored (Dempson *et al.*, 2004).

Ash content in a fish indicates the physiological role of muscle cells and display a marked value of mineral contents (Omotosho *et al.*, 2011). The advantage of fish consumption and risk of fish-eating could be determined by using the biochemical composition of fish. This would offer whether fish is risk-free and contain adequate nutrient gradients. Recently Municipal garbage dumping and industrial effluents with toxic materials in lakes and other water bodies pose a tremendous threat and risk to many fish species and humans. Toxicants of lakes were classified as mutagenic, cytotoxic and carcinogenic (More *et al*., 2003). Industrial metallic toxicants cause damage to fish growth, physiology and reproduction (Kerambrun *et al.*, 2011; Yousafxai and Shakoori *et al.,* 2011). Expanding industrialization near lakes and water bodies, accumulating domestic and industrial wastes, debris of constructions dumping into the lake caused a serious deterioration of water quality and emerged as a threat to the waterbody. Therefore, the present investigation was tried to determine and understand the biochemical and nutritive profile of commercial fishes collected from three different lakes which are quite prone to pollution, located in Coimbatore City, Tamilnadu, India and to examine the edible fishes for diet suitability.

Materials and methods

Fishes were collected from three different lakes, located in the latitude of Ukkadam (10°58'56.4"N, 76°57'21.5"E); Kurichi(10°57'58.7"N, 76°57'50.1"E); Perur (10°59'13.8"N, 76°53'45.1"E) in Coimbatore city, Tamilnadu, in December 2019. Collected specimens with similar body lengths and weight were chosen including varied species and procured to the laboratory using an icebox. Taxonomic identification was carried out with the help of standard literature (Fischer and Bianchi *et al*.,1984). Initial body weight (gm) and length (cm) were measured.

Biochmecial analysis

Ash and Moisture content were measured by AOAC (2005), Protein (Lowry et al.,1951), Lipid (Folch et al., 1957) and carbohydrate (Dubois et al.,1956)were estimated from the fish tissue. The energy value of selected fishes was computed and determined as the sum of each micronutrient present in the sample using conversion factors for nutrients that confer energy to mankind.

Results

Table – 1 Biochemical composition of studied fishes

Lake	Species	Moisture %	Ash (g/100g)	Protein (g/100g)	Carbohydrate (g/100g)	Lipids (g/100)	Energy (g/100g)
Ukkadam	*Catla catla*	78.34	94.79	19.8	1.34	10.60	250.34
	Labeo rohita	77.15	94.04	19.5	2.26	6.73	298.17
Kurichi	*Catla catla*	78.41	94.71	18.88	2.92	6.91	303.02
	Labeo rohita	75.4	92.76	19.7	1.90	10.89	263.76
Perur	*Catla catla*	88.35	93.72	22.6	1.39	11.51	141.35
	Labeo rohita	87.88	92.94	22.1	0.94	6.85	111.27

The collected samples were taxonomically identified for further study and their taxonomic classification were shown respectively. The biochemical composition and nutritional profile of collected fish species from different lakes of Coimbatore City, Tamilnadu, were tabulated and presented in Table-1. The analysis emphasized that protein content was high (22.6%) in *C. catla* collected from Perur lake and low was observed in *Catla catla* (18.88%) of Kurichi lake. Interestingly, energy value was indicated high in Ukkadam lake *Catla catla* species. Total protein content was ranged from 18.88 to 22.6g. The lipid content was found to be 6.73 – 11.51g range. Moisture content was ranged from 75.4 – 85.35% and Ash was shown to a range of 92.94 – 94.71g. Ash is considered to be the residues of inorganic materials while organic material is burned off. The energy value was recorded in the range of 111.27 – 303.02 Cal/100gm.

The analysis showed that the protein, carbohydrate, lipid and energy were as follows. Maximum protein in *C. catla* from Perur lake (22.6g/100g) was recorded and a minimum was observed in *Catla catla* species from Kurichi lake (18.88g/100g). Maximum carbohydrate content was found to be in the kuruchi lake *Catla catla* species (2.92 g/100g) whereas minimum showed in *Catla catla* (0.94g/100g) collected from Perur Lake. The high content of Lipid was estimated (11.51g/100) in *C. catla Perur lake* while low content was noticed in fish, *L. rohita* species as 6.73 mg/100 from Ukkadam respectively. Similarly, the maximum energy value was calculated in Kurichi *Catla catla* as 303.02 Cal/100g whereas the minimum was shown to be in *Labeo rohita* (111.27) collected from Perur lake.
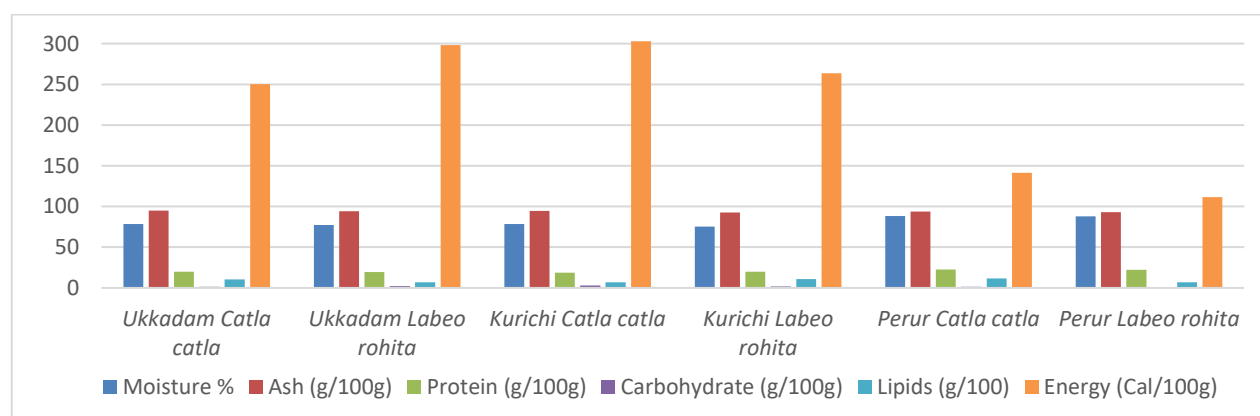

Figure-1 showing a nutritional profiling of selected fish species

UKCC- Ukkadam *Catla catla*, UKLR- Ukkadam *Labeo rohita*, KRCC- Kurichi Lake *Catla catla*, KRCC – *Labeo rohita*, PRCC-Perur *Catla catla*, PRLR- Perur *Labeo rohita*.

Discussion

Many reports dissipated that fish muscle tissue is highly digestible as it contains less connective tissue (Venkatraman and Chezhian,2015; Tidwell *et al*.,2001). In the present study, a proximate composition such as moisture percentage was found to be more in all fish species collected from three lakes. Similarly, protein content was recorded high in *C.catla* species collected from Perur lake and the level of protein has fluctuated among the studied fish group might be attributable to the spawning season of the fish. The protein content of examined fish species showed a range of 18.88-22.6g/100g. Maximum protein (22.6g/100g) was reported in *C. catla* perur lake whereas the minimum was found to be 18.88 mg/100g in *Catla catla* kuruchi lake.

These results are correlated with earlier works of several researchers such as Job *et al* (2015). It was believed and presumed that stress on fish metabolism caused in *Catla catla,* collected from Kurichi lake might have played a role in the content of protein depletion whereas Perur lake fish received less contamination and stress when compared to other lakes. The moisture content value is found in the range of 75.4 to 88.35% and indicated that fall within the acceptable limit. This was noteworthy that it favours the quality of the water body and stability of the lake when compared with other lakes, environmental conditions and inputs (Tsegay *et al*., 2016). Further, the results obtained by the present investigation were agreed in line with the findings of earlier researchers such as Khan *et al*. (2017) who demonstrated moisture levels as 80-90%. Present findings on moisture level were slightly increased and near the level of his results. This is believed to be attributable to the contamination it's caused a change in the feeding of the fish and reproductive behaviour when compared with other chosen lakes.

Subsequently, Ash content was observed within the range of 92.76– 94.79 g/100g. The maximum level was recorded by Ukkadam lake *Catla catla* whereas the minimum was recorded in *Labeo rohita* species from Ukkadam Lake both species nutrition values fluctuate determined by caused adverse effects caused by a pollutant. This is in agreement with the work of Laghari *et al*. (2019). Meanwhile, the carbohydrate and lipid content of the present studied fish showed the range of 0.94 g/100g to 2.92 g/100g (carbohydrate) and 6.73g/100g– 11.51g/100g (lipid) respectively. The carbohydrate content was found to be lower when compared to protein and lipid content. This variation of the fraction is attributable to the climatic modulation that fluctuates the content of the biochemical profile of fish. Our study elucidated that a low level of carbohydrate indicated that it played a negligible role in the energy reserve of water living animals (Love *et al* 1970). These findings correlated with the outcome of the work Selvaraj (1984) who reported as 2.0 – 2.05 g/100g as maximum content in liver cells of fish.

Similarly, Lipid content was considerably noticed in our study with a range of 6.73 – 11.51 mg/100 including necessary amino acids in our selected fish similar results were obtained in an earlier study conducted by (Mary *et al*., 2015). The efficiency of the fish diet is associated with its balance to the specific requirement of fish species. Therefore, it is notable that energy level was noticed within the range of 111.27 to 303.02 cal/100g. The low level might have been due to the exposure of toxicants in lake water influenced by the dumping of waste disposals.

Conclusion

The data presented confers valuable insights on nutritional value and profiling and explored the effects of water body contaminants on the selected fish species, which are being used for diet by adjoining people. However, all the species were tested from the respective lake that offers information and indicating the contaminant level of different lakes of Coimbatore city. This study helps to confirm the contamination of lake water does not influence the edible fishes as it falls within the limits. Various bio-accumulations will cause a negative impact it exceeds the tolerable limit. Therefore the data on the fish biochemical comparative study will form the basis for further research in this field of fish nutritional profiling for the benefit of human beings in future.

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