COMPARATIVE BIOCHEMICAL ESTIMATIONS IN EGGS AND MUSCLE TISSUE OF FISHS

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Abstract: Animal meat is a good source of protein for humans however, it is initiated that the source is unsatisfactory due to numerous aspects like economy and environmental conditions. In current examination, an effort has been made to compare the biochemical compositions of freshwater fish eggs and muscle tissue of *Catla catla* and *Labeo rohita*, in the following aspects: protein, carbohydrate, lipid, RNA, DNA, sodium and potassium. Samples of eggs and muscle were collected from the resident market of the Amravati city. Findings of the study reveal that, the carbohydrate, protein, RNA and potassium content in eggs of *Catla catla* were found more as compared to the eggs of *Labeo rohita* while as protein, carbohydrate and potassium content in muscle tissue of *Catla catla* were found more than the muscle tissue of *Labeo rohita* however, lipid content in muscle of *Labeo rohita* were more than the lipid content found in muscle of *Catla catla*.

***Key words*: Fish eggs, proteins, lipids, carbohydrates, DNA, RNA.**

1. Introduction

Catla (*Catla catla*) and Rohu (Labeo rohita), also named as the major Indian carps they are economically important South Asian freshwater fishes in the carp family, they are native to rivers and lakes of northern India, Bangladesh, Myanmar, Nepal, and Pakistan. Biochemical assessment is necessary to ensure the nutritional value as well as palatability of the freshwater fish (Azam et al., 2004). Knowledge on biochemical composition of muscles of major carps, Labeo rohita, Catla catla, and Cirrhinus mrigala, is of great help in evaluating not only its nutritive value but also helps in quality assessment and optimum utilization of these natural resources (Gonzalez et al., 2006). This, in turn, can help in processing the fish into products and other byproducts without wastage or loss of constituents such as free amino acids, proteins, and fats. Biochemical investigations on fish help to evaluate the impact of the environment. (Pampatwar et al., 2006) Fish is generally of high value compared to other protein foods, because of its high protein quality and palatability (Lovell, 1978). Fish eggs also have a good source for human nutrition due to their therapeutic role in reducing certain cardiovascular disorders (Stickney and Hardy, 1989). The biochemical composition of eggs is one of the factors determining egg quality since eggs must contain all the nutrients required for normal development during embryonic and yolk-sac larval stages. Several nutrients such as vitamins and essential fatty acids (EFA) have been suggested to be related to egg quality in both freshwater and marine fishes (Takeuchi et al., 1981; Watanabe 1985; Foley et al., 2016). More information on the relationship between egg composition and egg quality is needed for the improvement of egg quality (Watanabe et al., 1984).

2. Material and methods

The sample of fish eggs of *Catla catla* and Labeo rohita were collected from the local market of Amravati and the samples were stored in a deep freezer at -150^{0}c. The samples were taken accordingly from storage tubes at the time of examination. While as for the sample of muscle live fishes were collected from the local market and they were being sacrificed at the time of experimentation and samples were taken for examination. In the whole experimentation following methods were used; Total protein was estimated by (Lowry et al., 1951) method. Total carbohydrate by (Bligh and Dyer 1959) method and total lipid by (Dubois et al., 1956) method. Extraction of RNA and DNA was done by the procedure of (Burton et al., 1965) method. Estimation of RNA was done by the orcinol method of (Ashwell 1957) method and estimation of DNA was done by diphenylamine method of (Burton 1956). Values are expressed in mg/100mg for protein, carbohydrate, and lipid and µg/100mg for RNA and DNA. Estimation of minerals (Sodium and Potassium) was done with the help of flame-photometer. Values are given as mean±standard deviation.

3. Results and Discussion

The results of the analysis of biochemical compositions of Catla and Rohu were calculated and presented in Table-1,2,3 and 4. And the column charts were shown in Figure-1,2,3, and 4 respectively. From the experiment conducted, it was found out that Catla and Rohu is an excellent source of protein because of its low-fat content and it is one of the best nutritious foods for the human body due to its abundant protein. The amount of protein was found higher in fish eggs compared to the muscle. The carbohydrate content in fish eggs and muscle of these species reveals that there was no such great difference between the two sources however, carbohydrate content is more in fish eggs than muscle tissue. Moreover, the lipid content was also found highest in fish eggs than muscle. In the case of DNA, and RNA. it was also revealed that the biomolecule content was more in fish eggs than the muscle. Biochemical composition of tissue is a good indicator for the fish quality (Hernandez et al., 2001) in the current study it has been revealed that the fish eggs are more nutritious than muscle. Protein in fish is an excellent source, because of the amino acid composition and degree of digestibility (Louka et al., 2004). Body composition illustrates the nutritional quality of the food because the analysis of biochemical composition including protein and fat is very important in assessing food value (Kamal et al., 2007). The low values of carbohydrates recorded in the present study support the view that carbohydrate plays an insignificant role as energy reserve in aquatic animals (Love, 1970) Lipids are the primary energy storage material in fish (Love, 1970), (Adams, 1999) and (Tocher, 2003).

Biochemical composition of Catla catla macro biomolecules.

Table-1

S.no	Sample	Protein mg/100mg	Carbohydrate mg/100mg	Lipid mg/100mg
1	Eggs	38.78 ±0.33	0.444±0.02	1.44±0.04
2	Muscle	34.57±0.35	0.372±0.02	1.19±0.07

Each observation is Mean of 6 observations ± standard deviation.

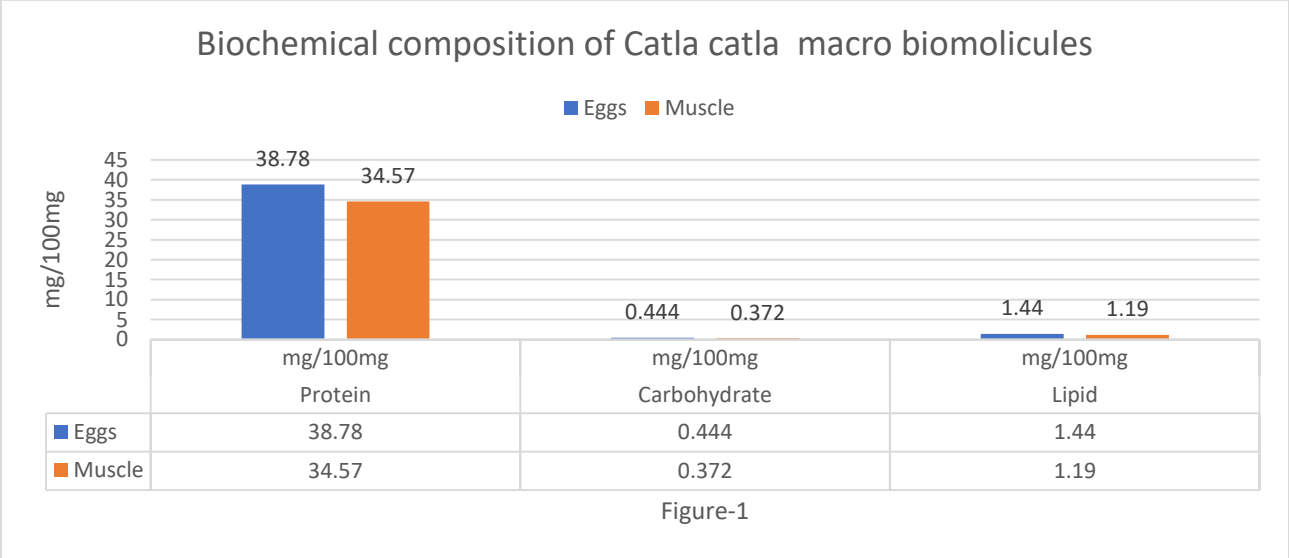

Figure-1

Biochemical composition of *Catla catla* micro biomolecules.

Table-2

sample	RNA **µg/100mg**	DNA **µg/100mg**	Sodium **µg/100mg**	Potassium **µg/100mg**
Eggs	0.66±0.04	0.34±0.02	0.77±0.03	0.82±0.03
Muscle	0.48±0.03	0.38±0.02	0.82±0.03	0.82±0.03

Each observation is Mean of 6 observations ± standard deviation.

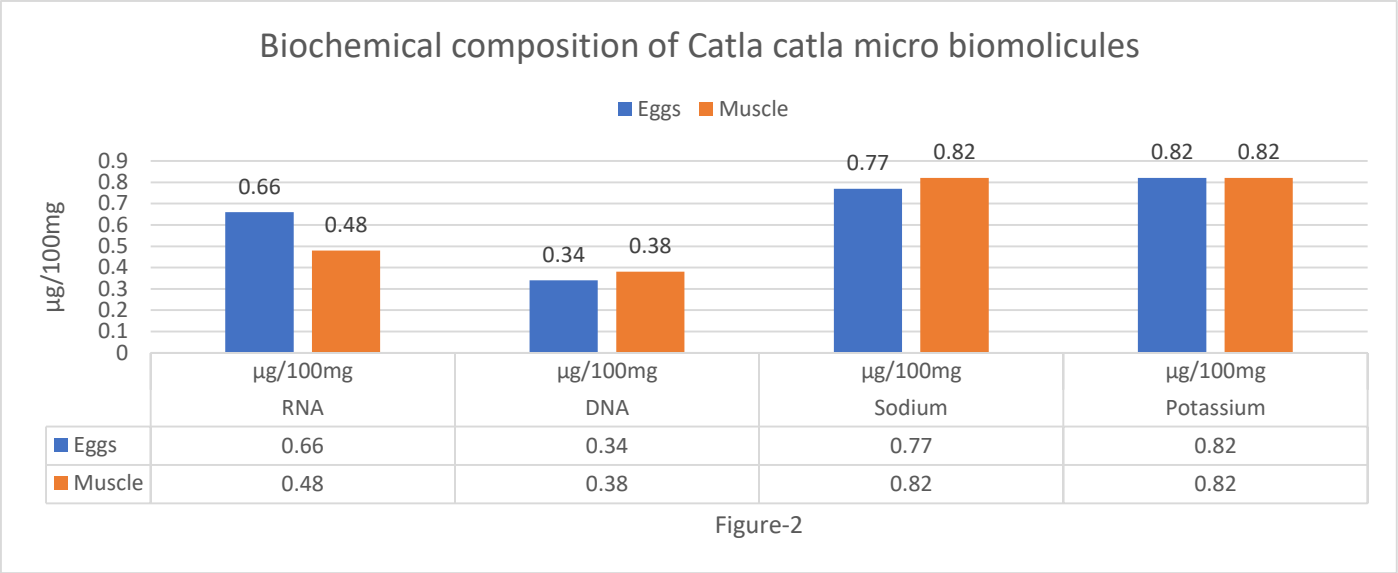

Figure-2

Biochemical composition of *Labeo rohita* macro biomolecules.

Table-3

S.no	sample	Protein mg/100mg	Carbohydrate mg/100mg	Lipid mg/100mg
1	Eggs	38.35±0.36	0.200±0.003	1.72±0.03
2	muscle	33.56±0.40	0.316±0.008	1.26±0.03

Each observation is Mean of 6 observations ± standard deviation.

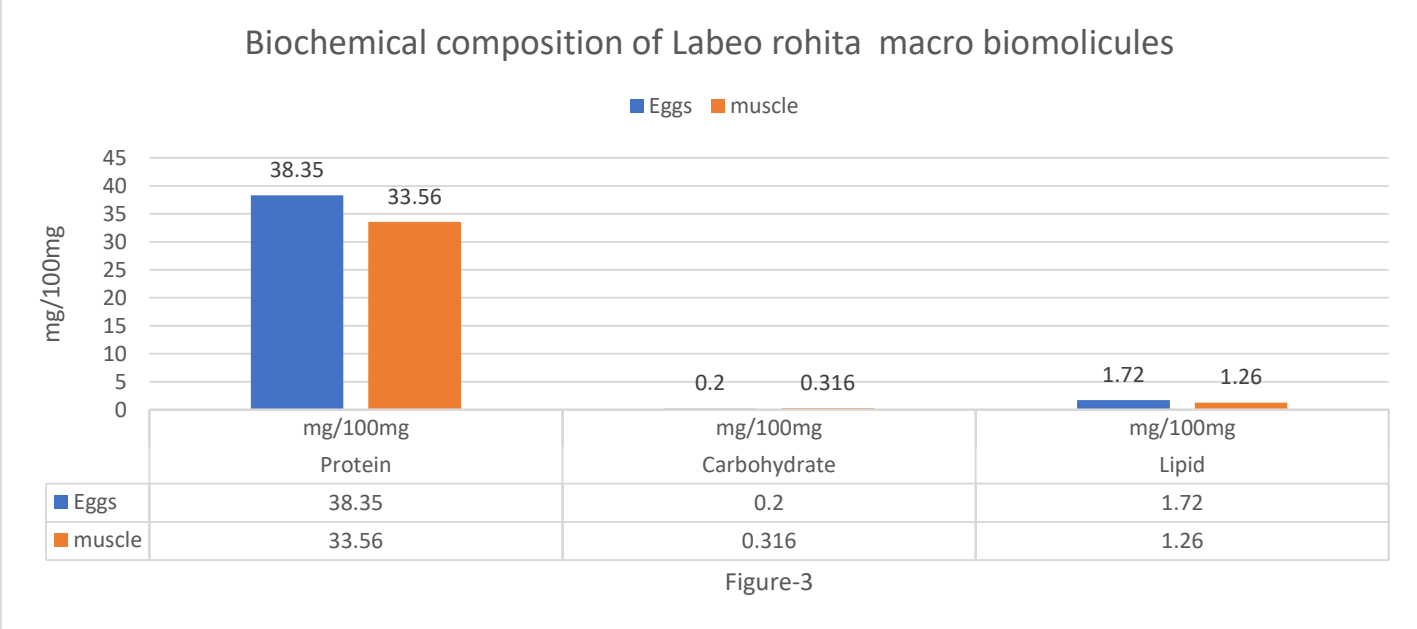

Figure-3

Biochemical composition of *Labeo rohita* micro biomolecules.

Table-4

Each observation is Mean of 6 observations ± standard deviation.

Sample	RNA **µg/100mg**	DNA **µg/100mg**	Sodium **µg/100mg**	Potassium **µg/100mg**
Eggs	0.53±0.03	0.40±0.008	0.82±0.02	0.77±0.01
Muscle	0.48±0.01	0.38±0.01	0.83±0.02	0.80±0.01

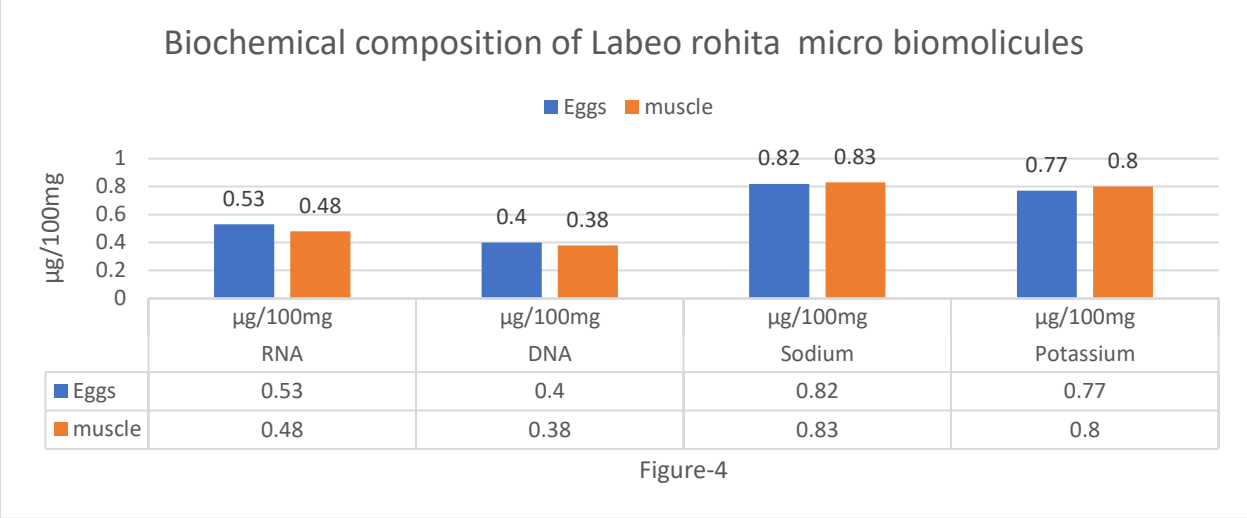

Figure-4

Comparison of biochemical estimations of *Catla catla and Labeo rohita* eggs

Table-5

S.no	**Biomolecule**	**Quantity in *Catla catla***	**Quantity in *Labeo rohita***
1	Protein	38.78 ±0.33	35±0.36
2	Carbohydrate	0.444±0.02	0.200±0.003
3	Lipid	1.44±0.04	1.72±0.03
4	RNA	0.66±0.04	0.53±0.03
5	DNA	0.34±0.02	0.40±0.008
6	Sodium	0.77±0.03	0.82±0.02
7	Potassium	0.82±0.03	0.77±0.01

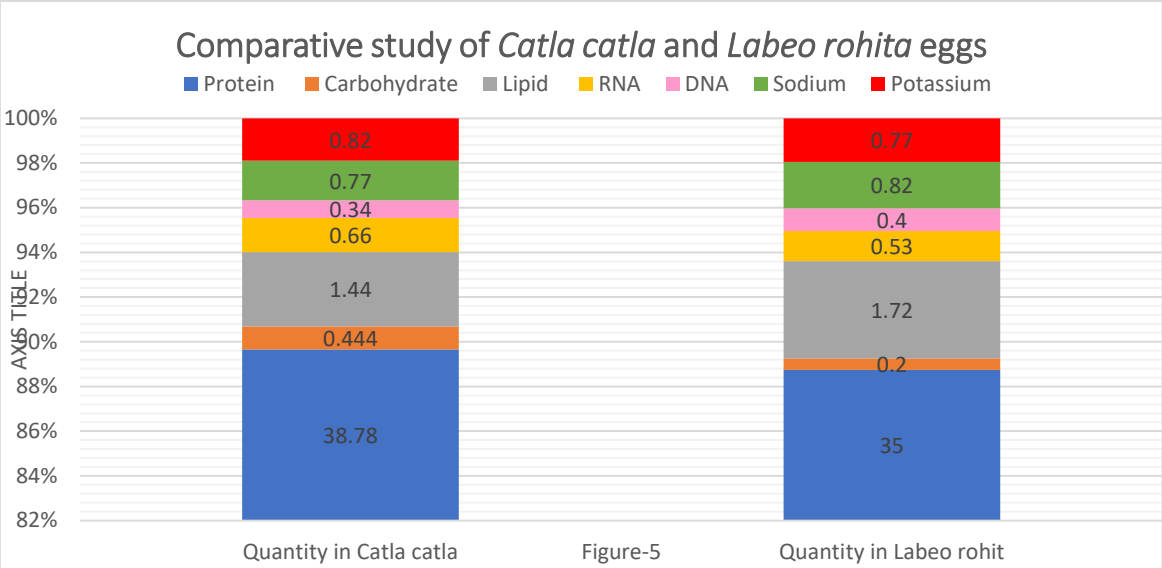

Figure-5

Comparison of biochemical estimations of Catla catla and Labeo rohita muscle tissue

Table-6

S.no	Biomolecule	Quantity in *Catla catla*	Quantity in *Labeo rohita*
1	Protein	34.57±0.35	33.56±0.40
2	Carbohydrate	0.372±0.02	0.316±0.008
3	Lipid	1.19±0.07	1.26±0.03
4	RNA	0.48±0.03	0.48±0.01
5	DNA	0.38±0.02	0.38±0.01
6	Sodium	0.82±0.03	0.83±0.02
7	Potassium	0.82±0.03	0.80±0.01

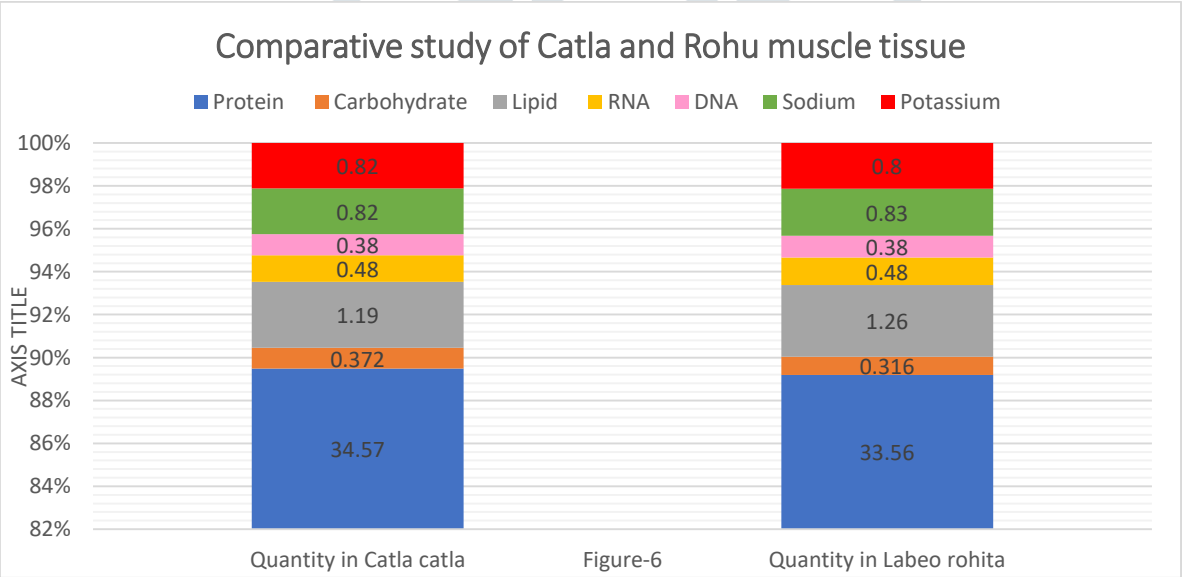

Figure-6

4. Conclusion

The present study revealed the comparison of fish eggs and muscle tissue of fish *Catla catla* and *Labeo rohita* biomolecules (micro and macro) composition of protein, carbohydrates, lipid, sodium, potassium, DNA and RNA. As the results reveal, that the fish eggs are more nutritious than muscle tissue of a fish, therefore this depicts a good nutritional quality of fish eggs as human food and it is an important source of animal protein.

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