ESTIMATION OF NUTRITIONAL CONTENTS OF A SMALL FOOD FISH, BANDED GOURAMI, WIDELY CONSUMED BY THE LOCAL BODO PEOPLES OF KOKRAJHAR, B.T.A.D., ASSAM, INDIA

Sharmistha Chakraborty[1], Mehdi Al Kausor[2*]

Abstract

Nutritional qualities of small fishes are a global point of research for the sustainable development of the nation. *Banded gourami* is a commonly available small fish widely consumed by the different communities of Kokrajhar, BTAD, Assam. These fish species are found in weedy bodies of waterlogged areas. The present study was undertaken to estimate the proximate composition, amino acid profile, fatty acids composition and selected minerals and vitamins of the small fish species Banded gourami (*colisa fasciata*) commonly admired by the local common peoples of Kokrajhar, BTAD, Assam. It was reported that the studied fish is having moisture, ash, protein carbohydrate and crude lipid contents are 73.1, 2.95, 17.22, 0.48 and 5.84 % respectively. The amino acid profile of the fish protein showed the highest content of the essential amino acid L-Histidine as 10.0%. The fish lipid was analysed to sort out the fatty acids and the result highlighted the presence of all the poly unsaturated fatty acids in small amounts except Palitic Acid (4.49%). Analysis of selected vitamins and minerals concluded the high content of Iron (18.23 gm) in the studied fish. It was found that the fish species *colisa fasciata* contained a fair content of Vitamin A (18.88 mg). The fish species *colisa fasciata* may be included regularly in the human diet for nutritional benefit.

Keywords: Amino acid profile, fatty acid composition, proximate composition, minerals and vitamins

[1*,2]Department of Chemistry, Science College Kokrajhar, Assam, India

***Corresponding Author:** Mehdi Al Kausor
Email: mehdialkausar@gmail.com

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Introduction:

Colisa fasciata is a small food fish widely consumed by the local peoples. They are basically omnivore and hence indulge in everything from flakes to frozen foods and live foods. However they can live on flakes only. In the present centuries one of the most focussed topic is nutritional potentialities of the natural resources. Fish food is getting more priority because fish is consumed mostly by different communities and different classes of people of the world almost regularly. Many works had been done in this area so far with special reference to those fish species which are commercially explored, and holding higher economic probability. The nutrient dense small fishes are sometimes overlooked due to their ease of availability and reachability (Roos et al.2007) in the developing countries. Assam, a state of North East India is highlighted to be one of the highest fish consumers among the inland states of the country (Debnath et al 2014). The recognition of excellence in fish food lies in the high-grade protein, good contents of unsaturated fatty acids, essential amino acids, minerals and vitamins indesiarable amount for the requirements of human consumption (Kumar,1992). Fish meat contains higher quality of n3 PUFAs compared to beef and chicken (Calder, 2004). Fish foods had long been specified as an important source of high-quality protein in human diet (Kumaran, 2012). Protein exists in the highest contents of all the nutrient as a component of the living being (Sucharita et al., 2015). Proximate composition are used as an indicator for the nutritional quality of fishes (Stansby, 1962). Proximate profile displays the moisture, ash protein, lipid and carbohydrate contents of the fish species. Lipids are vittal sources of metabolic energy and important for the formation of cell and tissue membrane (Babu et al., 2010). Fatty acids contained in the fish oil are significant source of omega3 fatty acids which are vitally needed for human nutrition, prevention of diseases and promotion of health (Frenoux et al., 2001). Fish muscle, head are the prime sources of very long chain unsaturated fatty acids which are found to have beneficial effects on human health (Ackman, 2000).

A lot of information had so far been gathered about the proximate compositions of commercial species of freshwater fishes (Sarower-E-Mahfuj et al., 2012, Naser et al.,2007). Fish albumin is established to be a potent source of human serum albumin (HSA) which is highly expensive (Suprayitno., 2003, Santoso, 2009). More than one billion people depend on fish as the key source of animal protein (FAO,2000). Fish protein are easily digestible by the human being. Moreover, fish food has been positively linked to health benefits. The long chain fatty acids contained in the fish lipid plays excellent in the prevention of human coronary artery diseases, improving retina, developing brain, decreasing the chances of breast cancer, rheumatoid arthritis, multiple sclerosis, asthma psoriasis, inflammatory bowel diseases and regulation of prostaglandin synthesis (Dhaneesh et al.,2012).

Studies on the complete nutritional profile of the fishes particularly small fish species are of prime importance to ensure the common people whether these are nutritionally enriched and should be included in the regular diet.

Materials & Methods:

Total of 500 g fish species of *colisa fasciata* were sold from the local markets. They were immediately transported to the laboratory in ice box.In the laboratory they were thoroughly washed under tap water. The average length and breadth were measured to the nearest centimetre scale and the body weight were measured to the nearest gram.The fish samples were tightly packed in an airtight container and stored frozen until biochemical analysis.

Biochemical analysis:

The moisture and ash contents of the fish species were estimated following DGHS LAB MANUAL (6.0) and the protein and carbohydrate content were estimated using the method IS: 7219:1973 (RA 2005) and IS: 1656-2007) respectively. The percentage of total lipid were estimated following DGHS Lab manual.

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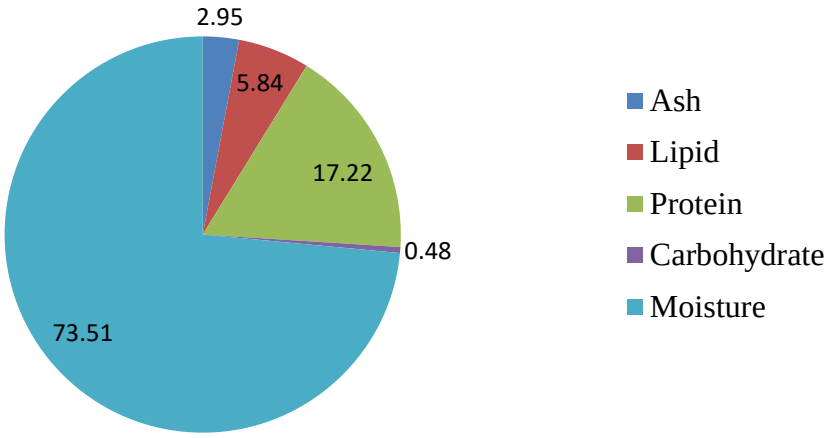
Amino acid composition was determined by following the method of QA.16.5.10. Analysis of Vitamin A and Vitamin D was performed by using HPLC according to the method of (QA.16.5.3). The Fatty acid profile was done using GC (FID) according to the method described by (AOAC 19 th edition 996.06). The mineral such as Iron, Zinc, Calcium were estimated by using UV- Visible Spectrophotometer, AAS, according to the method of (QA.16.5.2). Phosphorus was estimated by

using uv-visible spectrophotometer, AAS following the method of (IS:14828:2000).

Results & Discussion:

The length, breadth and weight of the fish species were 5.7 cm, 10.4 mm and 7.65 gm respectively. The moisture, ash, protein, carbohydrate and crude lipid contents of the fish were 73.51, 2.95, 17.22, 0.48 & 5.84 respectively in percentages. It was found that the fish *colisa fasciata* was rich in high protein content and also very good moisture contents.

Figure:1 Proximate composition (%) *Colisa fasciata*



The fatty acids composition were determined and tabulated in table.3. The result concludes that the fish species is rich in palmitic acid (4.49%) followed by Oleic acid (1.29%).

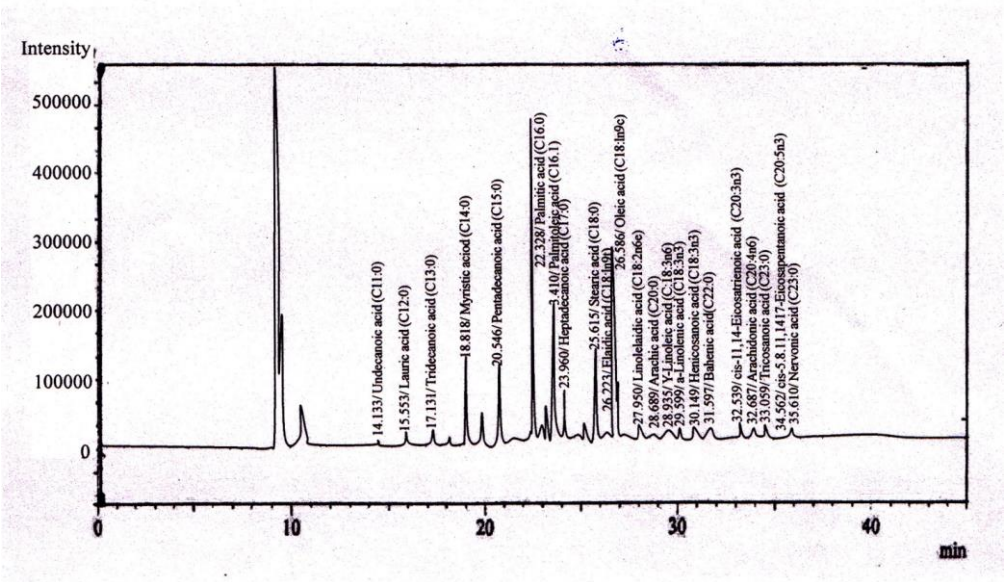


Figure: 2 GC-MS Chromatogram of Fatty acids in *Colisa fasciata*

Table: 2.2.7 Peak Table of Fatty acids of *Colisa fasciata*

Peak#	Name	Ret.Time	Area	Height	Area%
1	Undecanoic acid(C11:0)	14.133	17070	5120	0.2973
2	Lauric acid(C12:0)	15.553	35604	10424	0.6200
3	Tridecanoic acid(C13:0)	17.131	33378	22357	1.3475
4	Myristic acid(C14:0)	18.818	369510	105093	6.4350
5	Pentadecanoic acid(C15:0)	20.546	375278	107206	6.5355
6	Palmitic acid(C16:0)	22.328	2079891	446638	36.2214

7	Palmitoleic acid(C16:1)	23.410	675275	172078	11.7596
8	Heptadecanoic acid(C17:0)	23.960	211568	63088	3.6845
9	Stearic acid(C18:0)	25.615	436375	122506	7.5995
10	Elaidic acid(C18:1n9t)	26.233	21929	5287	0.3819
11	Oleic acid(C18:1n9c)	26.586	1267658	254866	22.0763
12	Linoleic acid(C18:2n6c)	27.950	32460	7667	0.5653
13	Arachidic acid(C20:0)	28.689	35532	10561	0.6188
14	Y-Linolenic acid(C18:3n6)	28.935	9024	2574	0.1572
15	a-Linolenic acid(C18:3n3)	29.599	27726	8111	0.4828
16	Henicosanoic acid(C21:0)	30.149	11518	3560	0.206
17	Behenic acid(C22:0)	31.597	20810	6094	0.3624
18	Cis-11,14,17-Eicosatrienoic acid(C20:3n3)	32.539	3085	931	0.0537
19	Arachidonic acid(C20:4n6)	32.687	4562	1099	0.0795
20	Tricosanoic acid(C23:0)	33.059	10913	3129	0.1900
21	Cis-5,8,11,14,17-Eicosapentaenoic acid(C20:5n3)	34.562	15005	4081	0.2613
22	Nervonic acid(C24:1)	33.610	409	1034	0.0698
Total			5742162	1363504	100.0000

Table.3: Fatty acid profile of the fish species

Fatty Acids	Percentage
Butyric acid	<0.1
Caproic acid	<0.1
Caprylic acid	<0.1
Capric acid	<0.1
Undecanoic acid	<0.1
Lauric acid	<0.1
Tridecanoic acid	0.12
Myristic acid	0.38
Myristoleic acid	<0.1
Pentadecanoic acid	0.38
Cis-10 Pentadecanoic acid	<0.1
Palmitic acid	4.49
Cis-10 Heptadecanoic acid	<0.1
Stearic acid	0.44
Oleic acid	1.29
Elaidic acid	0.13
Linoleic acid	<0.1
Linolelaidic acid	<0.1
Arachidic acid	<0.1
Cis_11,14-Eicosadienoic acid	<0.1
Cis-8,11,14-Eicosatrienoic acid	<0.1
Cis-11,14,17-Eicosatrienoic acid	<0.1
Arachidonic acid	<0.1
Cis-5,8,11,14,17-Eicosapentaneoic acid	<0.1
Heneicosanoic acid	<0.1
Behenic acid	<0.1
Erucic acid	<0.1
Cis-13,16-Docosadienoic acid	<0.1
Cis-4,7,10,13,16,19-Docosahexaenoic acid	<0.1
Tricosanoic acid	<0.1
Lignoceric acid	<0.1
Palmitoleic acid	0.69

Gamma-Linolenic acid	<0.1
Alpha-Linolenic acid	<0.1
Heptadecanoic acid	0.22
Cis-11-Eicosenoic acid	<0.1
Nervonic acid	<0.1

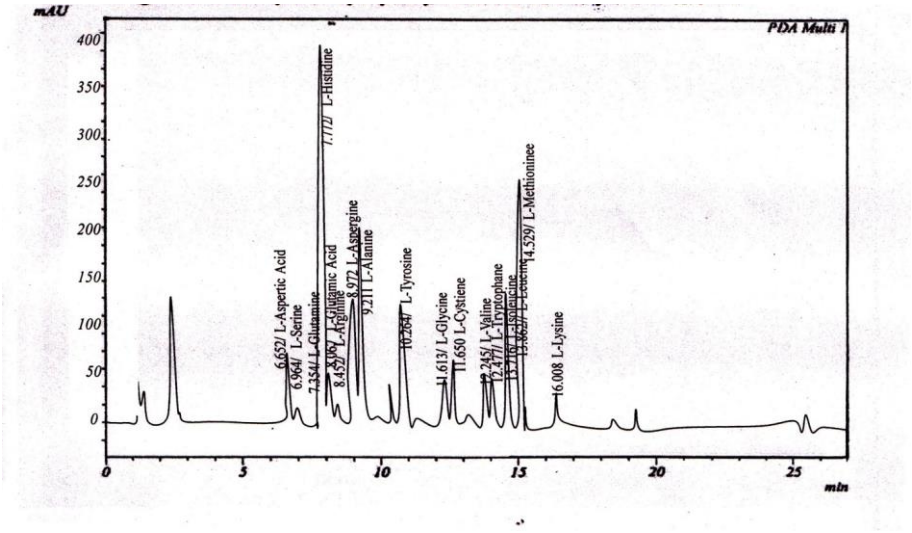


Figure.3 HPLC Chromatogram of Amino acids of *Colisa fasciata*

Table: 4 PeakTable for HPLC Data of amino acid of *Colisa fasciata*

Peaks #	Name	Area	Area%
1	L-Aspertic Acid	557604	5.445
2	L-Serine	73029	0.713
3	L- Glutamine	3882	0.038
4	L- Histidine	3750594	36.624
5	L- Glutamic Acid	291258	2.844
6	L- Arginine	56746	0.554
7	L- Aspergine	835431	8.158
8	L-Alanine	1586643	15.494
9	L-Tyrosine	250786	2.449
10	L- Glycine	4334	0.042
11	L- Cystiene	9535	0.093
12	L- Valine	541874	5.291
13	L- Tryptophane	360751	3.523
14	L- Phenylalanine	62757	0.613
15	L- Isoleucine	385485	3.764
16	L- Leucine	321482	3.764
17	L- Methionine	1135823	11.091
18	L- Lysine	12658	0.123
Total		10240670	100.000

Table-5 Amino acid profile of the fish species

Amino acid profile	**Results in percentage**
L-Serine	0.11
L-Tryosine	0.47
L-Histidine	10.0
L-Isoleucine	0.51
L-Leucine	0.45
L-Lysine	<0.05

L-Methionine	1.49
L-Phenylanine	0.15
L-Threonine	<0.05
L-Tryptophan	0.48
L-Valine	0.58
L-Alanine	1.43
L-Arganine	0.21
L-Asparagine	1.46
L-Aspartic acid	0.74
L-Cystine	<0.05
L-Glutamic acid	0.39
L-Glutamine	<0.5
L-Glycine	<0.05
L-Proline	0.24

The amino acid profiling was done and the result was tabulated in table-5. The fish species was reported to be rich in the essential amino acid, L-Histidine (10.0%). Histidine plays multiple roles in protein interactions (Liao et al., 2013) and good precursor of histamine. It is required for the growth and repair of tissue, maintenance of myelin sheath, removing heavy metals from the body (Heimann 1982). The small fish *colisa fasciata* may definitely be recommended for the daily consumption to enrich the human nutrition. Previous researchers documented the high contents of Histidine in another small indigenous fishes like *A. testutidineous*, *A. mola* and *P. sophore* (Mahanty et al., 2014). In the present study the essential amino acids like phenylalanine, valine, tryptophan, threonine, isoleucine, methionine, histidine, argentine, leucine and lysine were detected All of them are daily required by human for healthy living (Joint FAO/WHO/UNO 2007).

The selected minerals were estimated and were tabulated in table-6. The analysed fish species was found to be rich in Phosphorous (3.52 gm) content. Phosphate metabolism may be disturbed in many diseases specially those affecting the kidneys and bones (Islam et al., 2013).The current test report was similar with the content of Phosphoros, documented by (CSIR, 1962) 1.20% in Sharput and Puntius sarana. The small fish species are consumed whole i.e along with their teeth and heads. So, they can be a vital source of Phosphorous for the people. Phosphorous is an important mineral for the development of teeths of the human being. The selected Vitamin contents were analysed and tabulated in Table-7. The fish *colisa fasciata* is enriched in Vitamin A (18.88 µg/100g**)**. It can be consumed regularly for the development of retina.

Table.6 Mineral content of the fish species

Minerals	**Results**
Iron	18.23 mg
Zinc	2.98 mg
Phosphorus	3.52 g
Calcium	1.64 g

Table.7 Vitamin content of the fish species

Vitamins	Result
Vitamin A	18.88µg
Vitamin D	<5.0µg

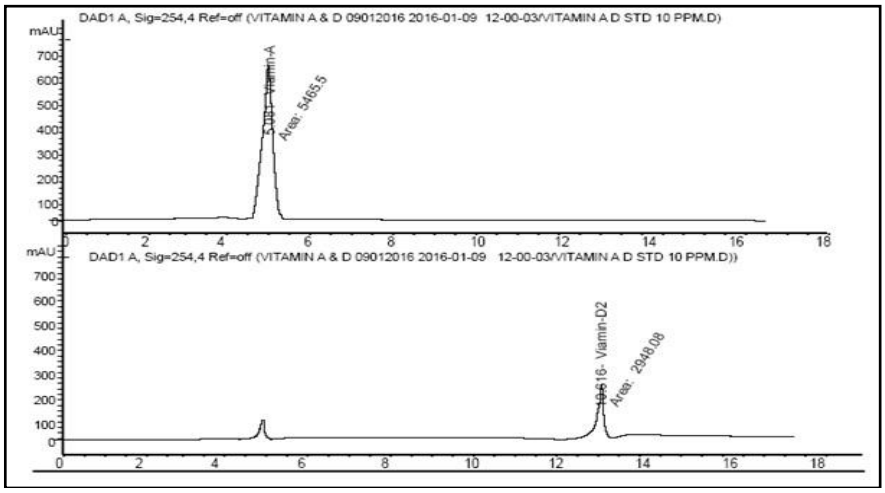


Figure: 4 HPLC Chromatogram of Standard Vitamin Aand Vitamin D solutions

AREA PERCENT REPORT

Peak	RetTime Type (Min)	Width (Min)	Area (mAU*S)	Area	Name
1	5.081 MM	0.1627	5465.49854	100.0000	Vitamin-A
2	10.616 MM	0.2648	29848.07886	100.0000	Vitamin-D2

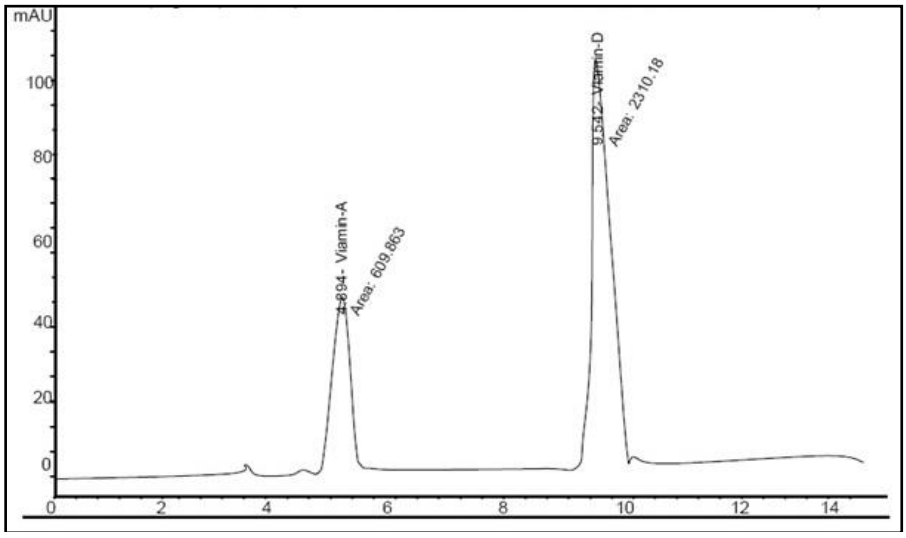


Figure: 5 HPLC Chromatogram of *Colisa fasciata*

AREA PERCENT REPORT

Peak	RetTime Type (Min)	Width (Min)	Area (mAU*S)	Area	Name
1	4.894 MM	0.2161	609.86255	20.8854	Vitamin-A
2	9.542 MM	0.3526	2310.17896	79.1146	Vitamin-D
Total :			2920.04150		

Conclusion:

The small fish species of colisa fasciata are experimented to be enriched in high nutrient profile. This fishes may show excellance if commeecially explored. Scientific measures should be opted for better preservation of them. They are important also from the medicinal point of views. Furthermore, studies are required on investigation of the nutritional aspects of these fishes In our present study it may be inferred that the fish *colisa fasciata* may be a good choice for human consumption as well as research works.

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