IARJSET

ISSN (Online) 2393-8021
ISSN (Print) 2394-1588

*International Advanced Research Journal in Science, Engineering and Technology*
*Vol. 3, Issue 3, March 2016*

# Assessment of Biochemical Quality of Ten Selected Dried Fish Products of North East India.

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**Abstract**: Analysis of biochemical quality was carried out on ten indigenous fish species of North East India which were dried and preserved by traditional methods. The species included *Noemacheilus beavani, Chanda ranga, Barilius tileo, Amphipnous cuchia, Anabas testudineus, Amblypharyngodon mola, Channa punctatus, Tor putitora, Puntius chola* and *Conta elongate.* The samples were collected from several rural markets of the state of Assam, Arunachal Pradesh and Manipur. The parameters observed were moisture content, protein, lipid, ash content and pH. The biochemical analysis was done by the methods described in AOAC, 1980. Moisture content ranged between 2.77% (*Barilius tileo*) to 8.92% (*Amblypharyngodon mola*). Protein content varied in the range of 28.63% (*Channa punctatus*) to 53.84% (*Chanda ranga*). Lipid content exhibited wide variation in the range of 4.42% (*Barilius tileo*) to 16.52% (*Chanda ranga*). Ash content ranged between 8.96% (*Noemacheilus beavani*) to 30.30% (*Tor putitora*). Except *Amblypharyngodon mola, Channa punctatus, Tor putitora* and *Conta elongate* all the other samples have a pH value near neutral.

**Keywords**: Ash, Biochemical composition, Dried fish, Lipid, Moisture, NE India.

## I. INTRODUCTION

Fish is a rich source of protein and essential nutrients. So it plays a vital role in the diet of human beings (Geetha et al. 2014). Nutritional studies showed that fish protein is ranked in the same class as chicken protein, yet beef protein, milk and egg albumin are inferior to it (Srivastava, 1959). Due to its high perishable nature, several processes like drying, smoking, salting, curing are often carried out to preserve fishes for a longer period of time. Dried fish is a source of low cost dietary protein and is used as a substitute of fresh fish. Dried fish is one of the most popular food items of NE India. Its popularity is inferred by presence of the largest dried fish market, "Jagiroad dried fish market" in the district of Morigaon, Assam (Vijayan and Surendran, 2012).

Fish drying is an age-old traditional practice among the diverse ethnic groups of NE India. During monsoon season, various fish species become abundant in this region. The local people use to catch a large volume of fishes out of which a bulk amount is generally preserved by various methods of drying (Sharma et. al). In general, the prepared dried fish is used as a side dish. Many dry fish producer sell their products in the markets for livelihood. The traditional dry fishes have demand in the local markets. However, in recent years, the buyers have been showing concern about the quality and nutritional status of the dry fish product. Similar concern has also been showed elsewhere (Siddique and Aktar). In Bangladesh, significant work on nutritional parameters of dry fishes has been done by several workers [Flowra et al. (2012), Islam et al. (2013)]. Food value of dry fishes was also evaluated in India (Geetha et al., 2014). However, report on quality analysis of the traditionally processed dried fish of NE India is almost unavailable. Only recently, the present group of workers has reported biochemical quality analysis of ten selected dried fishes of NE India (Ullah et al., 2016). That work has covered ten fish species locally known as Bhokua, Chanda, Dorikona, Goroi, Mua (i), Mua (ii), Ngupi, Phabaonga, Puthi, and Ukabi. In the present paper, information on nutritional values is given on another ten selected indigenous dried fish prepared by ethnic communities. The species included in the present study are locally known as Botia, Chanda, Seleng, Kusia, Ngabema, Mukanga, Ngamu, Ngui dingkoo, Puthi, and Singora/Tingra

## II. MATERIALS AND METHODS

### *A. Study Area*

North East India, the eastern-most region of India is selected for our study as dried fish is enormously used in this region. Samples were collected from three different states namely Assam, Arunachal Pradesh and Manipur.

### *B. Sample Collection*

Samples were collected from different rural markets of Assam, Arunachal Pradesh and Manipur. The sampling sites are listed in table1. For each species, five samples were collected from different sellers of the same market. The samples were indigenous fish species which were processed locally using traditional methods. All the fish samples were enumerated giving local name, scientific name and place of collection. The samples were taken to the laboratory in airtight polythene bags and stored at 4°C for biochemical investigation.

### *C. Biochemical Analysis*

Biochemical analysis such as moisture content, lipid content, ash content, pH were analysed according to AOAC, 1980.

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TABLE 1: SAMPLES WITH SAMPLING SITE

| Name of Samples | | Sampling points |
|---|---|---|
| **Common** | **Scientific** | |
| Botia | *Noemacheilus beavani* | Assam (Gorchuk) |
| Chanda | *Chanda ranga* | Assam (Gorchuk) |
| Seleng | *Barilius tileo* | Assam (Bizni) |
| Kusia | *Amphipnous cuchia* | Assam (Dibrugarh) |
| Ngabema | *Anabas testudineus* | Manipur (Imphal) |
| Mukanga | *Amblypharyngodon mola* | Manipur (Imphal) |
| Ngamu | *Channa punctatus* | Manipur (Imphal) |
| Ngui dingkoo | *Tor putitora* | Arunachal Pradesh (Naharlagun) |
| Puthi | *Puntius chola* | Assam (Gorchuk) |
| Singora/ Tingra | *Conta elongate* | Assam (Gorchuk) |

*1) Moisture content:* 5g of dried fish sample was taken and kept at 105° C in the hot air oven until a constant weight is obtained. The difference in weight can be calculated and expressed as % moisture content of the sample. Percentage can be calculated by the following formula:

Moisture % = (weight of tissue – dry weight of tissue) X 100/weight of tissue

*2) Protein content:* Protein content was determined by Lowry's method with slight modification (Lowry et al.,1951). To a 10 mg of sample 1 ml of 1N NaOH was added for protein extraction in water bath for 30 minutes. Thereafter, it was cooled at room temperature and neutralized with 1 ml of 1N HCL. The extracted sample was centrifuged at 2000 rpm for 10 minutes, and an aliquot of the sample (1 ml) was further diluted with distilled water (1/9 v/v). From the diluted sample, 1 ml was taken and treated with 2.5 ml of mixed reagent (carbonate – tartarate – copper) and 0.5 ml of 1N Folin's reagent. After 30 minutes, sample absorbency was read at 750 nm using uv-visible spectrophotometer (EVOLUTION 201, Thermo Scientific) and results were expressed in percentage.

*3) Lipid content:* 3 gm of dried sample was extracted with petroleum ether in a soxhlet apparatus for about 8 hours. After that the petroleum ether was removed by fractional distillation. The flask was dried at room temperature and the amount of lipid in the flask was calculated.

% lipid= (weight of lipid/ weight of sample) × 100.

*4) Ash content:* About 3-5g prepared sample was taken in pre-weighed porcelain crucible and was placed in muffle furnace at 550°C for 6 hours. Then the crucibles were a cooled in desiccators. After recording the weight of ash, the ash content of the sample can be computed as below

% Ash content = Weight of ash /weight of sample × 100

*D. Determination of pH*

1 g sample was homogenized in 10 ml of distilled water and the mixture was filtered. The pH of the filtrate was measured using a pH meter (Cyberscan 510) (Farid et al.2014).

## III. RESULTS AND DISCUSSION

The proximate composition of the dried fish collected from various places is presented in table2. The moisture content of the dried fish samples was in the range 2.77 to 8.92, with the highest value in Mukanga (*Amblypharyngodon mola)* and the lowest in Seleng (*Barilius tileo*). Flowra et al. (2012) reported the level of moisture in the range of 24.58% to 14.06%. According to Haque (2004) normally the sun dried fish contain an average of 10-20% moisture. Islam (1982) found that the traditionally dried rui fish contain 9.07% of moisture. Geetha et al. (2014) reported the moisture value of sundried *Trichiurus lepturus* L., in the range of 4.0 - 8.3 depending on sampling site. While working with *Sardinella fimbriata*, Immaculate et al. (2012) found that naturally sundried, hygienically sundried using solar dryer and fishy rack moisture content were 11.60%, 8.3% and 4.0% respectively. Flowra and Thumpa (2013) reported that the moisture content of five selected dried fish species ranged from 12.13% to 18.18%. Mansur et al. (2013) found that the moisture content had ranged from 19.17 to 23.12 in three selected dried fish species. Our study was carried out in summer and the samples were kept in sealed condition in the market. Though relative humidity is high in NE India, the moisture content is found to be low due to proper packaging and good storage facility.

The protein content ranged from 28.63% to 53.84%. Highest protein content was observed in Chanda (*Chanda ranga*) , while the lowest in Ngamu ( *Channa punctatus*). Flowra et al. (2013) reported the protein content of five selected dried fish species in the range of 44.08% (M. *vittatus*) and 65.65% (T. *haumela*) of the moisture basis and 53.45 to 76.39% respectively on dry matter basis. Flowra and Tumpa(2012) found that protein content of selected dried fishes varied from 28.20 % (Wallago attu) to 51.19 % (Palaemon sp.). Azam et al. (2003) reported that the protein content varied between 40.69 to 66.52% in fourteen selected dried fish species. Mansur et al. (2013) found the protein content ranged from 49.23 to 62.85% in three selected dried fish species. Rahman et al. (1982) observed protein content in dry fish in the range of 55.75-64.49%. It is desirable to have a high percentage of protein in food products which is an important factor in case of quality analysis.

Lipid content of selected dried fish species ranged from 4.42 to 16.52. The highest lipid content was found in Chanda (*Chanda ranga*) and the lowest in Seleng (*Barilius tileo*). While working with five dried fish sample Flowra et al.(2012) found The highest lipid content was in M. *vittatus* (17.76% based on moisture content and 21.54% on dry matter) and the lowest in C. *punctatus* (1.91 and 2.31% based on moisture content and dry matter content respectively). Again Flowra and Tumpa (2013) reported the fat content of five dried fish species varied from 5.38% (Labeo bata) to 15.86 % (Wallago attu). Islam et al. (2013) found lipid content in the range of 3.21 to 14.03% where the highest value in *Amblypharyngodon mola* and the lowest in *Channa punctatus* . Geetha et al.(2014) reported the lipid content in the range of 0.65-0.4% which differs significantly from our study.


DOI 10.17148/IARJSET.2016.3339

IARJSET
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Ash content of the samples ranged from 8.96 to 30.30%. The highest ash content was found in Ngui dingkoo (*Tor putitora*) and the lowest was observed in Botia (*Noemacheilus beavani*). Flowra et al. reported that the ash content in dried fish ranged between 9 to 30% on the basis of moisture and dry matter contents. In 23 different dried fish species ash content varied over a large range 1.4-21.6% (Hussain et al. 1992). Flowra and Tumpa (2013) observed the ash content in five dry fishes in the range of 10.78% in *Labeo bata* to 15.67% in *Palaemon* sp. Azam et al. (2003) reported 5.08 to 12.14% of ash content in fourteen dried fishes. Ash content of *Cirrhina reba* was found to be 1.7% (Islam et al., 2013). Mansur et al.(2013) found the ash content in the range of 11.11-18.89% in three dried fish species. Ash content reflects fair degree of importance of a species as a source of minerals and our findings are in agreement with other reported values.

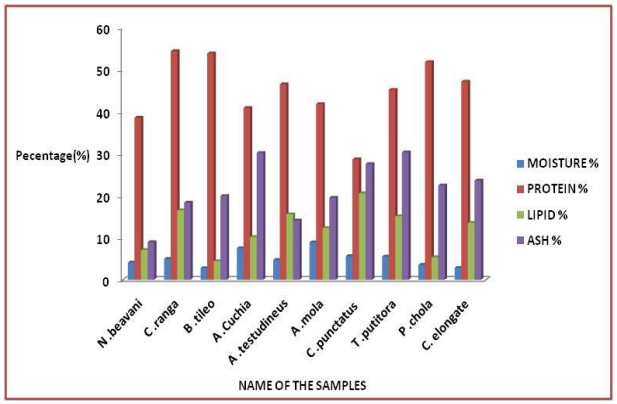


Fig. 1 Proximate composition of ten dried fishes


Fig. 2. Ten selected dried fish samples

TABLE 2: PROXIMATE ANALYSIS OF TEN SELECTED DRIED FISH SAMPLES

| Samples | % of moisture | % of protein | % of lipid | % of ash | pH |
|---|---|---|---|---|---|
| *Noemacheilus beavani* | 4.11 | 38.54 | 7.08 | 8.96 | 6.86 |
| *Chanda ranga* | 4.98 | 54.39 | 16.52 | 18.35 | 6.85 |
| *Barilius tileo* | 2.77 | 53.84 | 4.42 | 19.94 | 6.77 |
| *Amphipnous cuchia* | 7.52 | 40.88 | 10.18 | 30.19 | 6.82 |
| *Anabas testudineus* | 4.73 | 46.50 | 15.59 | 14.11 | 6.79 |
| *Amblypharyngodon mola* | 8.92 | 41.79 | 12.29 | 19.52 | 8.06 |
| *Channa punctatus* | 5.61 | 28.63 | 20.58 | 27.53 | 7.91 |
| *Tor putitora* | 5.55 | 45.18 | 15.10 | 30.30 | 7.43 |
| *Puntius chola* | 3.54 | 51.79 | 5.38 | 22.46 | 6.84 |
| *Conta elongate* | 2.83 | 47.15 | 13.55 | 23.62 | 7.33 |

## IV. CONCLUSION

The present study revealed the nutritional parameters of selected dried fish products of NE India. Percentages of protein levels were found satisfactory. Moisture content was found to be low. Overall, the dried fish products were found considerable for hygienic and food quality point of view.

## ACKNOWLEDGMENT

The authors are thankful to DST-SERB, Government of India for providing for financial support in terms of a major research project. We also acknowledge the Ministry of Food Processing Industries, Government of India, New Delhi who considered the project for inclusion under the agenda of DST-SERB. We are thankful to the traditional dry fish producer for providing us necessary samples.

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