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CHEMICAL COMPOSITION OF FIVE SELECTED DRY FISH SPECIES IN CHALAN BEEL, BANGLADESH

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ABSTRACT
Five selected traditionally dried fish species e.g. *Puntius ticto, Labeo bata, Wallago attu, Channa striatus and Palaemon* sp. were collected for the nutritional composition from the study area, Chalan Beel, Singra. The nutritional composition of protein, moisture, ash and fat of selected dried species was recorded. Chemical analyses were done by following equations. Moisture content (g/100g of sample) = weight of moisture / weight of fish sample × 100, ash content (g/100g of sample) = weight of ash obtained / weight of fish sample × 100, fat content (g/100mg of sample) = Weight of the ether extractive / Weight of the fish sample × 100 and protein content (g/100mg of sample) = weight of protein obtained / weight of fish sample × 100. The analytical data on chemical composition showed that the moisture content was found varies from 12.13% *(Puntius ticto)* to 18.18% (*Palaemon* sp.). Ash content of was ranging from 10.78% (*Labeo bata*) to 15.67% (*Palaemon* sp.). Protein content of selected dried fishes varied from 28.20% (*Wallago attu*) to 51.19 % (*Palaemon* sp.). Fat content of the dried fishes varied from 5.38% (*Labeo bata)* to 15.86 % (*Wallago attu*). Knowledge on biochemical composition of fish will help the processors to define the optimum processing and storage conditions for premium quality products.

KEY WORDS: Ash, Dry fish, fat, moisture, protein

INTRODUCTION

Fish plays a very important role in nutrition supply for people. Scientists believe that better health of the people can be ensured quickly and economically through greater production of fish (Bargstram, 1961). Nutritional studies have proved that fish protein rank in the same class as chicken protein and are superior to beef protein, milk and egg albumin (Srivastava, 1959). In recent years the nutritional importance of aquatic food has increased substantially because of scientifically recognized beneficial effects of eating aquatic food, fats and oils. Fish contributes enormously to the supply of both macro and micronutrients in our diet. Dry fish is also an important source of high-quality and highly digestible protein and a respectable source of essential minerals (Nettleton, 1992).

Drying is regarded as a traditional and primitive method of preservation of fish. As fish is a perishable food commodity, it requires preservation for future uses. Several preservation methods are followed over the world for preserving fish. Aims of all these methods are same to extend the shelf-life of fish so that the fish can be used in future properly. Drying is the oldest known method of preserving perishable food items including fish. Drying is used to describe any process involving the removal of water from fish or fish product by evaporation (Eyo, 2001). Objective of this study was analysis of chemical composition of dry fish. The chemical composition is an important aspect of fish quality and influences both the keeping quality and the technological characteristics of the fish. Since composition may vary considerably with season and catching areas, it is often necessary to make repeated analysis. The main chemical components of fish meat, e.g. moisture, protein, lipid and ash have the largest impact on the nutritive value, the functional properties, the sensory quality and the storage stability of meat. The other constituents, i.e. carbohydrates, vitamins and minerals, though minor quality, also play a significant part in biochemical process taking place in tissue post-mortem. They are co-responsible for sensory properties, nutritive value and wholesomeness of the product.

MATERIALS AND METHODS

Five types of freshwater dried fishes (*Puntius ticto, Labeo bata, Wallago attu, Channa striatus and Palaemon* sp) were collected from Chalan beel, Shingra Upazilla. This is an extensive low land area at the lower *Atrai* basin in the northeastern region of Bangladesh spread across the districts of Natore, Pabna Noagaon and Sirajgang. The legendary Chalan beel lies between 24.35° to 24.70° North latitude and 89.10° to 89.35° East longitudes. The area of this beel is 375 sq. km. during flood period from July to November and 52-78 sq. km. at dry winter and summer. The average depth is more than 2 m during dry season and more than 4 m at rainy season. It is the largest beel of the country. After collection, specimens were brought to Biochemistry Research Laboratory, Department of Biochemistry and molecular biology of Rajshahi University for chemical analysis. The nutritional compositions of dried fishes were determined by methods of Analysis of Official Agricultural Chemists (AOAC, 1980). Every analysis was done in three times from the three samples of each species. Then average of the three results was calculated.

Determination of Moisture Content: The change of weight is estimated under certain temperature and pressure. Moisture of fish is commonly determined by drying a sample at some elevated temperature and reporting the loss in weight as moisture.

Calculation: The percent (%) of moisture content was calculated by the following equation. Moisture content (g/100g of sample) = Weight of moisture / Weight of fish sample × 100.

Determination of Ash Content: Ash in the fish and fish products is readily determined by incineration either raw or dried sample at about 600°c for 3-5 hours, depending on the methods used. The residue is weight and reported as ash. Care was taken to oxidize all the carbon during the determination. Refined vegetable oil was added to the ash and continues the incineration continued for several hours to obtain a pure white ash.

Calculation: The percent (%) of ash content was calculated by the following equation. Ash content (g/100g of sample) = Weight of ash obtained / Weight of fish sample × 100.

Determination of Protein Content: Protein is estimated by the method of Wong (1923) of the specimen.

Calculation: The percent (%) of protein content was calculated by the following equation. Protein content (g/100mg of sample) = Weight of protein obtained / Weight of fish sample × 100.

Determination of Fat Content: The fat was extracted from the sample with ethyl ether or petroleum ether, after extraction, the solvent was removed from the sample by evaporation. The residue was then weighted and reported as fat in the present investigation, the fat content was determined by "Soxhlet Apparatus method".

Calculation: The percent (%) of fat content was calculated by the following equation. Fat content (g/100mg of sample) = Weight of the ether extractive / Weight of the fish sample × 100.

RESULT AND DISCUSSIONS

Moisture content: The moisture of living systems contributes as much to the essential properties of life. The moisture content of different fishes varies from species to species. In the present study moisture content of five selected dried fish species ranged from 12.13% to 18.18%. The highest value was found in *Palaemon* sp and lowest value was in *Puntius ticto.* The analysis of data on moisture content of five selected dried fish species are given in table 1.

More or less similar result was found by Nurullah (2005) and reported that the moisture content of the six dried fish species viz. *A. mola*, *O. cotio cotio*, *P. atherinoides*, *M. vitatus* and *G. chapra* ranged from 14.38 to 18.48%. Islam (1982) studied the proximate composition of traditionally dried Rohu fish and observed the moisture content as 9.07%. Acoording to Bhattacharyya *et al*. (1985) the markets samples of sun-dried *Gudusia chapra* had moisture ranging from 9.61% to 18.64%. Faturoti (1985) showed that the gutted dried fish samples of African catfish (*Clarias nigrodigitus)* had a chemical composition of 6.27 to 10.92% moisture. Humayun (1985) stated that sun-dried Rohu fish contained 10.30% moisture. From the report of Valsan *et al.* (1985), non-penaeid prawn of Bombay markets that high moisture of 24.3% for unsalted sun-dried fish products promotes the growth of microorganism and accelerates the rate of spoilage. Hussain *et al*. (1992) stated that the moisture content varied over a large range from 12.3%-54%. Saha (1999) observed 36.50% to 82.80% of moisture in thirteen sun dried fishes which are of known as small indigenous species (SIS). Azam *et al*. (2003) studied biochemical assessment of fourteen selected dried fish and observed that moisture content ranging from 18.23-23.61%. Shahiduzzaman *et al.* (2004) conducted an investigation on seasonal variation of biochemical composition in batashi fish (*Clupisoma atherinoides).* He found moisture content around 3%.

Ash content: From the present study found ash content varied from 10.78% to 15.67%. The highest value was found in *Palaemon* sp and lowest value was in *Labeo bata.* The analysis of data on ash content of five selected dried fish species are given in table 1.

More or less similar results were found in past. Nurullah (2005) worked on *A. mola*, *O. cotio cotio*, *P. atherinoides*, *M. vitatus* and *G. chapra*. He found the ash content varies from 10.71 to 14.97%. Hussain *et al*. (1992) stated that the ash content varied over a large range 1.4-21.6% in 23 different dried species. Azam *et al*. (2003) studied biochemical assessment of fourteen selected dried fish and observed that ash content were in the range of 5.08-12.14%. Islam *et al*. (2003) experimented on the nutritional composition of a popular fresh water species *Cirrhinas reba* and found that the ash content of this species was 1.7%

Protein content: Protein content varied from 28.20% to 51.19%. The highest value was found in *Palaemon* sp and lowest value was in *Wallago attu.* The analysis of data on protein content composition of five selected dried fish species are given in Table 1.

Hussain *et al*. (1992) found the range of protein content varied over from 17.2-78% in 23 different dried species. Keshava and Sen (1982) worked in proximate composition of fatty fishes and reported that mean values for protein was 75.3%. Islam (1982) studied the proximate composition of traditionally dried Rohu fish and observed the protein content as 73.26%. Faturoti (1985) showed that the gutted dried fish samples of African catfish (*Clarias nigrodigitus)* had a range of crude protein was 55.02 to 63.05%. Humayun (1985) stated that sun-dried Rohu fish contained 73.93% protein. Kalaimani and Kamasastri (1988) conducted an experiment at four fish drying yards on the species used, drying practices and the quality of the dried products and found the protein content of the samples varied of a large range from 17.2% to 78% over the 23 species analyzed. Al-Habib (1990) estimated the protein content of six fresh water fishes and he observed that these fishes contained 11-16.75% protein. Saha (1999) observed 34.90% to 46.70% of protein in thirteen sun dried fishes which are of known as small indigenous species (SIS). Azam *et al*. (2003) studied biochemical assessment of fourteen selected dried fish and observed that the protein content varied between 40.69-66.52%.

Fat content: Fat content varied from 5.38% to 15.86 %. The highest value was found in *Wallago attu* and lowest value was in *Labeo bata.* The analysis of data on fat content of five selected dried fish species are given in table 1.

The more or less same result found by Azam *et al*. (2003). He studied on biochemical assessment of fourteen selected dried fish and observed that fat content was in the range of 7.1-26.13%. Shahiduzzaman *et al.* (2004) conducted an investigation on seasonal variation of biochemical composition in batashi fish (*Clupisoma atherinoides)* and found fat content 3%. Nurullah (2005) reported that the lipid content of solar dried SIS (*A. mola*, *O. cotio cotio*, *P. atherinoides*, *M. vitatus* and *G. chapra*) varied from 14.10 to 16.26%.

Table 1: Showing the chemical composition of five selected dry fish species:

Fish Species	Moisture Content (%)	Ash Content (%)	Protein Content (%)	Fat Content (%)
Puntius ticto	12.13	11.27	47.32	9.47
Labeo bata	12.35	10.78	45.72	5.38
Wallago attu	14.70	13.33	28.20	15.86
Channa striatus	16.03	13.72	33.23	8.96
Palaemon sp	18.18	15.67	51.19	11.53

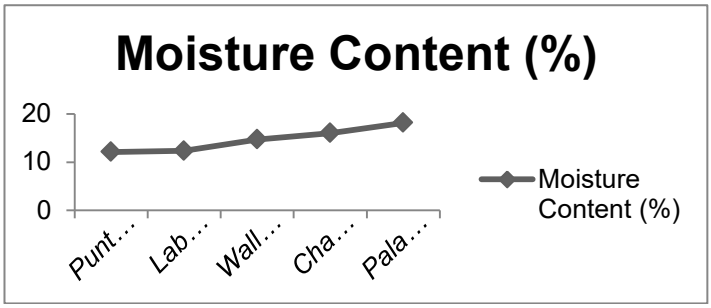

Figure 1. Showing the moisture content (%) of different dry fish species

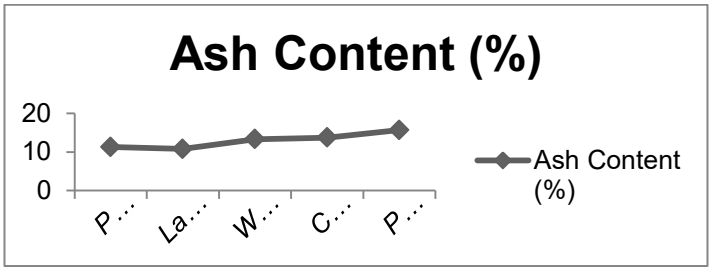

Figure 2. Showing the ash content (%) of different dry fish species

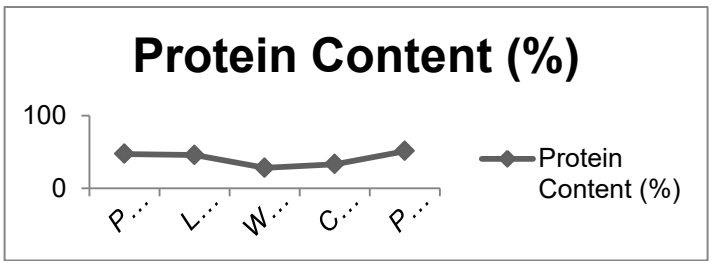

Figure 3. Showing the protein content (%) of different dry fish species

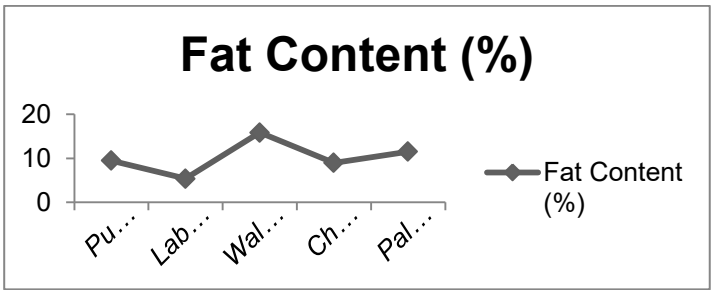

Figure 4. Showing the fat content (%) of different dry fish species

CONCLUSION

Drying method is very effective because of its simplicity and versatility. Dried fishes are delicacy for a large section of people throughout the country. It is also a source of currency earning because the large sized dried fishes are exported. In the year 2009-2010 622 mt dry fish was exported which total price was 25.06 crore tk (DOF, 2011). Fish drying is not only a profitable sector but also it is much rich in nutritive value.

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