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NUTRITIONAL PROPERTIES OF SOME NOVEL SELECTED FISH SPECIES IN KHUZESTAN PROVINCE, IRAN

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ABSTRACT

The proximate biochemical contents of some fish species i. e. Thunnus alalunga, Evynnis japonica, Caulerpa lentillifera, Orcynopsis unicolor and Euthynnus affinis were analyzed. Protein contents was determined in T. alalunga (22 %), E. japonica (13.02%), C.lentillifera (26.9%), O. unicolor (22%) and in E. affinis (24%) respectively. Fat content was recorded as 23.3%, 0.24%, 15%, 16% and 14% respectively in the five species of fish. The ash content was highest in C. lentillifera (8.8%). The present findings revealed that the highest protein content was recorded as in C.lentillifera (26.9%), but the fat was highest in T. alalunga (23.3%). The overall nutrient contents of studied medium indigenous fishes were observed as higher or equal to those of larger fish species.

Keywords: Proximate composition, Indigenous fish species, Thunnus alalunga, Evynnis japonica, Caulerpa lentillifera, Orcynopsis unicolor, Euthynnus affinis, Iran.

1. INTRODUCTION

Fish is one of the most important sources of valuable protein and has been accepted as a high biological source of protein and other elements for the maintenance of healthy body (Andrew, 2001). They have important role in nutrition, income, employment and foreign exchange earning of the country. Frozen fish and fisheries products contribute to nearly 5% of the country's foreign exchange earnings of Iran (Ahmed, 2003). Fisheries contribute about 80% to the nation's animal protein intake (Department of Fisheries, 2003). Medium and small indigenous fish species are valuable source of macro and micronutrients and play an important role to provide essential nutrients for the people of Iran. Medium indigenous fish have high nutritional value in terms of proteins and vitamins that are not commonly available in other foods. They were once abundant in rivers, and sea. They are usually caught by a large number of subsistence fishermen and provide a major protein of animal protein intake of poor households. So it is essential to know the proximate composition of the fish to report their nutrient composition from the public health point of view. There are some information on the biochemical and nutritional studies of some freshwater fish species (Sarower-E-Mahfuj *et al.*, 2012). Rubbi *et al.* (1987) mentioned proximate

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composition of some commercial species of freshwater fish. Naser *et al.* (2007) stated the proximate composition of shellfish (prawn and shrimp) in Iran. Stansby (1954) has established that information on the chemical composition of fish in respect to the nutritive value is important to compare with other source of animal protein, foods such as meat and poultry products. In spite of huge amount of fish protein consumption, there are a few reports on the nutritive or caloric values of small indigenous fish. Medium indigenous fish particularly *Thunnus alalunga*, *Evynnis japonica*, *Caulerpa lentillifera*, *Orcynopsis unicolor* and *Euthynnus affinis* are believed to have high degree of nutritive elements. Therefore, the aim of the present study was to determine the proximate composition of these indigenous fish of Iran.

2. MATERIALS AND METHODS

A good number of indigenous fish like *Thunnus alalunga*, *Evynnis japonica*, *Caulerpa lentillifera*, *Orcynopsis unicolor* and *Euthynnus affinis* were collected from different fish markets of Behbahan city during April to June 2011. After collection, fishes were immediately carried to the laboratory of the Behbahan Khatem Alanbia University of Technology, Behbahan for analysis.

After washing with tap water, the fish were frozen at -18° C until laboratory analysis. Proximate compositions of fish were determined by conventional method of AOAC (Association of Official Analytical Chemicals) on weight basis. (AOAC, 1995).

2.1. Estimation of Moisture

The initial weight of the samples was taken. Then samples were dried in an oven (Memmet 854 Schwabach) at about 105°C for about 8 to 10 hours until a constant weight was reached and cooled in a desiccator and weight again. In next stage, the samples were minced in an electric grinder. Moisture content was calculated by the following equation:

Percentage (%) of moisture = (Weight loses/Original weight of sample) × 100

2.2. Estimation of Fat

For the determination of fat content, the dried samples left after moisture estimation were finely grinded and the fat was extracted with a nonpolar solvent, ethyl ether.

After extraction of fat, the solvent was evaporated and the extracted materials were weighed. The fat content was calculated as: Percentage (%) of fat = (Weight of extract/Weight of sample) × 100

2.3. Estimation of Protein

The protein content of the fish was analyzed by micro-kjeldahl method. It involves conversion of organic nitrogen to ammonium sulphate by digestion with concentrated sulphuric acid in a microkjeldahl flask. The digest was diluted, made alkaline with sodium hydroxide and distilled. The liberated ammonia was collected in a boric acid solution and was determined titrametrically. The protein content in the sample was calculated by the following equation:

Percentage (%) of protein = (c-b) × 14 × d × 6.25/a × 1000 × 100

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Where, a = sample weight (g)

b= volume of NaOH required for back tittration and nuetralize 25ml of 0.1N H_2SO_4 (for sample)

c= volume of NaOH required for back tittration and neutralize 25 ml of 0.1N H_2SO_4 (for blank)

d=normality of NaOH used for titration

6.25= conversion factor of N to protien

14= atomic weight of N

2.4. Estimation of Ash

The ash content of a sample is the residue left after ashing in a muffle furnace (Gerhardt) at about 550-600^{0}C till the residue become white. The percent of ash was calculated as follows:

Percentage (%) of ash = (Weight of ash / Weight of Sample) × 100

Data were analyzed by using SPSS.11 statistical programme with five per cent level of significance.

3. STATISTICAL ANALYSIS

The data were performed in triplicate and results were expressed as mean ± SD and were analyzed by SPSS statistical programme.

4. RESULTS AND DISCUSSION

4.1. Protein Content

The protein content was estimated as 22%, 13.02%, 26.9%, 22% and 24% in *T. alalunga*, *E. japonica*, *C.lentillifera*, *O. unicolor* and *E. affinis* respectively. The highest content was obtained in *C.lentillifera*, and lowest value recorded in *E. japonica*. Figure 1 state that the variation of protein contents among the studied fish is not so high and it ranged from 13.02%- 26.9%. It is due to mainly for species variation. This result more or less coincides with the findings of Nabi and Hossain (1989) and of Salam *et al.* (1995). This result also states that the protein content in *T. alalunga*, *C.lentillifera*, *O. unicolor* and *E. affinis* is higher than that of *Heteropneustes fossilis* which was found to be 18.25% by Salam (2002).

4.2. Fat Content

Table 1 shows the fat contents in different medium indigenous fish species. The highest value of lipid content was recorded in *T. alalunga* (23.3%) (Figure 2). The fat content recorded in all species except *E. japonica* was more than the result of Habashi (1972) in *Cyprinus carpio* and of Nabi and Hossain (1989) in *P. gonionotus*. Salam (2002) estimated the highest fat content as 3.25 % in *H. fossilis*. This amount is less than of all species except *E. japonica*.

4.3. Ash Content

The present findings state that the ash contents of some medium indigenous fish species are less than of other fishes. It may be due to lesser amount of skeleton in the indigenous fish species. (Figure 3).

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4.4. Moisture Content

The major component of fish muscle was moisture. The moisture content varied from 80% to 46%. The highest content was found in *E. japonica* whereas the lowest content was in *C.lentillifera* (Figure 4). The moisture content was recorded as 51%, 80%, 46%, 50.8, 52.5% in *T. alalunga*, *E. japonica*, *C.lentillifera*, *O. unicolor* and *E. affinis* respectively (Table 1). This result coincides with the findings of Nabi and Hossain (1989) in *M.aculeatus* and Salam *et al.* (1995) in *P. gonionotus*.

The variation of different nutrient contents within species is shown in Table 1 (Figure 5). However, the result of the present investigation states that the proximate composition of different medium indigenous fish more or equal to other larger species, though the price of the fishes is very lower than larger species of fish. Therefore, medium indigenous fishes can play a significant role to fulfill the nutrient demand of poorer sections of people of the country. According to Stansby (1954), Salam *et al.* (1995) and Jacquot (1961), variation in proximate composition of fish flesh may vary with species variation, season, age and the feeding habit of fish. The chemical composition of flesh may vary largely between and within species (Jacquot, 1961). Here the differences may be due to the difference in the fish species used. It has been shown in present study that medium indigenous fish do not differ significantly in their nutrient and biochemical compositions. *E. japonica* contains lowest of nutritional values. Each fishes that contain high protein and fat contents, have high nutritional values, because of these fishes contain poly unsaturated fatty acids, omega-3 fatty acids and essential amino acids that have high biological values.

5. ACKNOWLEDGEMENTS

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Table-1. Variations of protein, fat, moisture and ash (%) in different small indigenous fish species

Fish species	Protein (%)	Fat (%)	Moisture (%)	Ash (%)
T. alalunga	22±1.6	23.3± 1.4	51± 2.1	3.27± 1.2
E. japonica	13.02±2.28	0.24±0.03	80±1.3	0.77 ±0.05
C.lentillifera	26.9±1.93	15±3.93	46±2.11	8.8±2.23
O. unicolor	22 ±0.28	16 ±0.17	50.8±1.8	2 ±0.06
E. affinis	24 ±0.19	14±0.14	52.5±2.3	3.27±1.2

Results are means ± standard deviation of triplicates

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Figure-1. Variation of protein contents (%) in different fish species Results are means ± standard deviation of triplicates

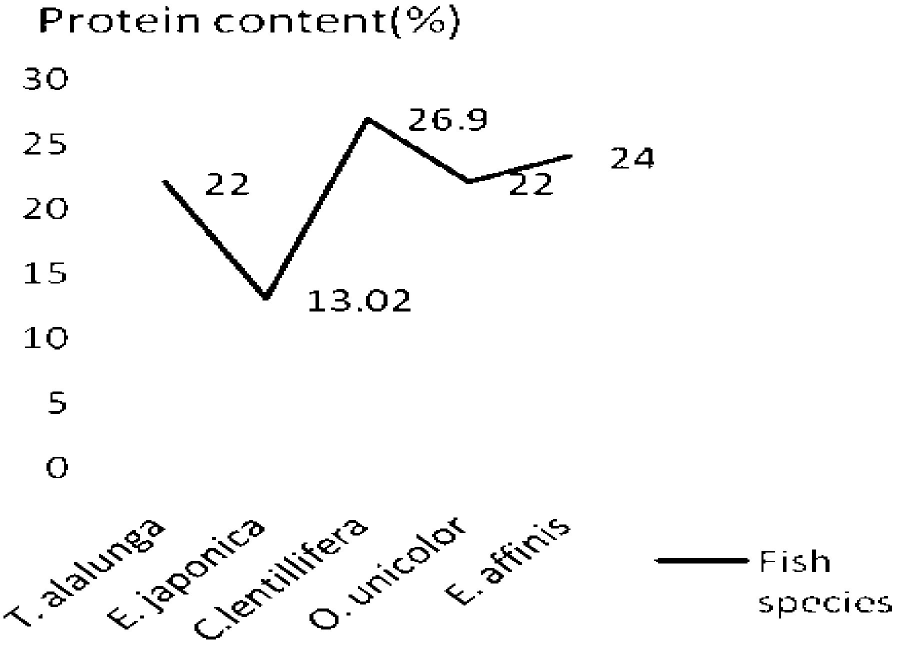

Figure-2. Variation of fat contents (%) in different fish species Results are means ± standard deviation of triplicates

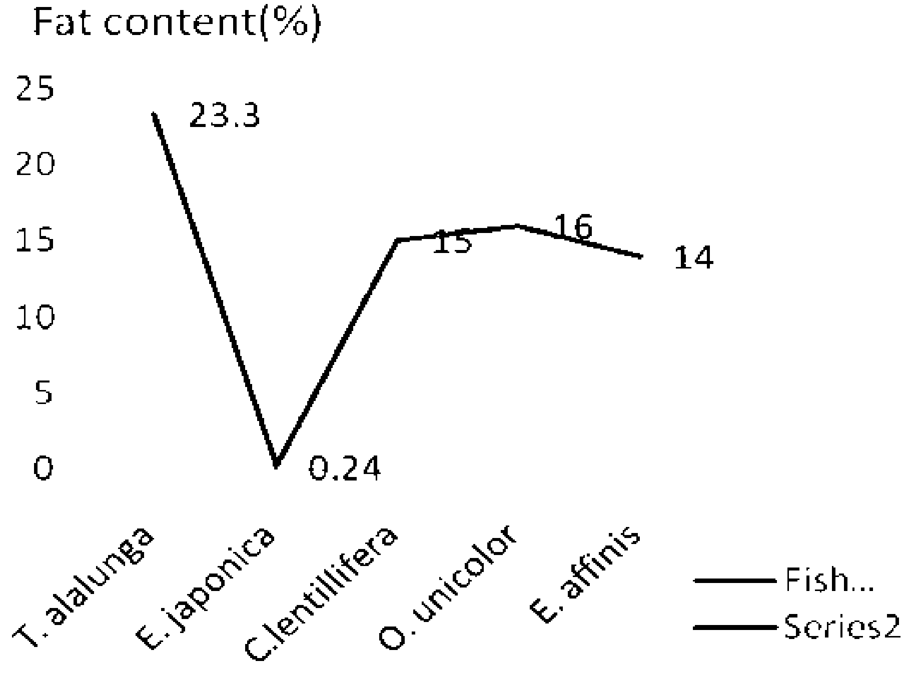

Figure-3. Variation of ash contents (%) in different fish species Results are means ± standard deviation of triplicates

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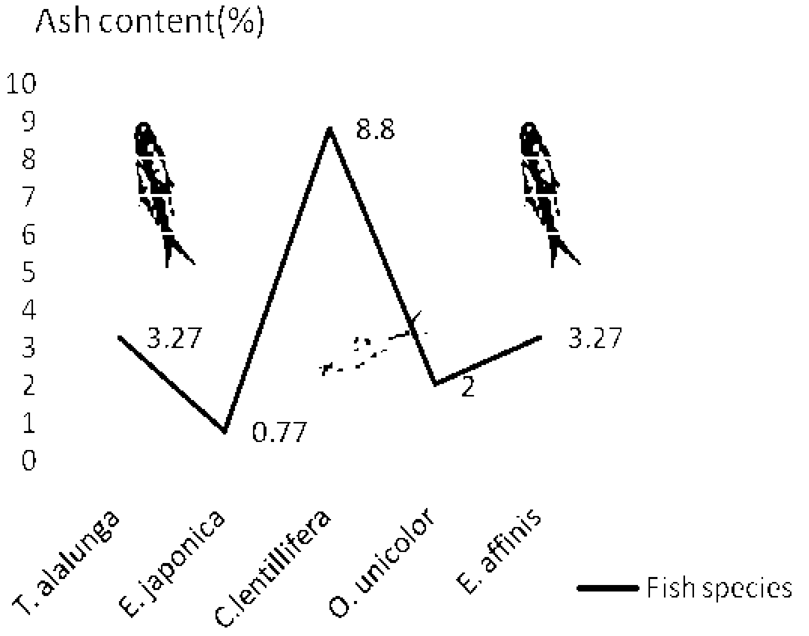

Figure-4. Variation of moisture contents (%) in different fish species Results are means ± standard deviation of triplicates

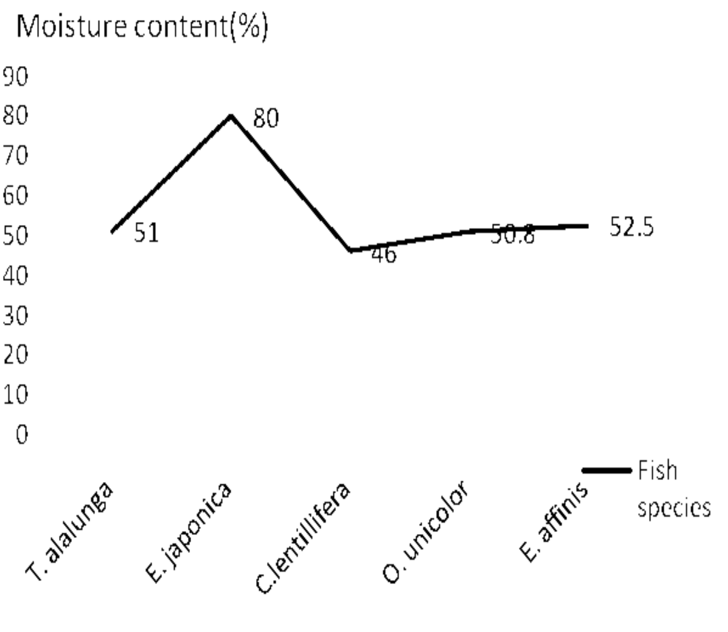

Figure-5. Pie diagram showing the nutrient compositions within species: A) *T. alalunga* B) *E. japonica* C) *C.lentillifera* ,D) *O. unicolor* E) *E. affinis.*

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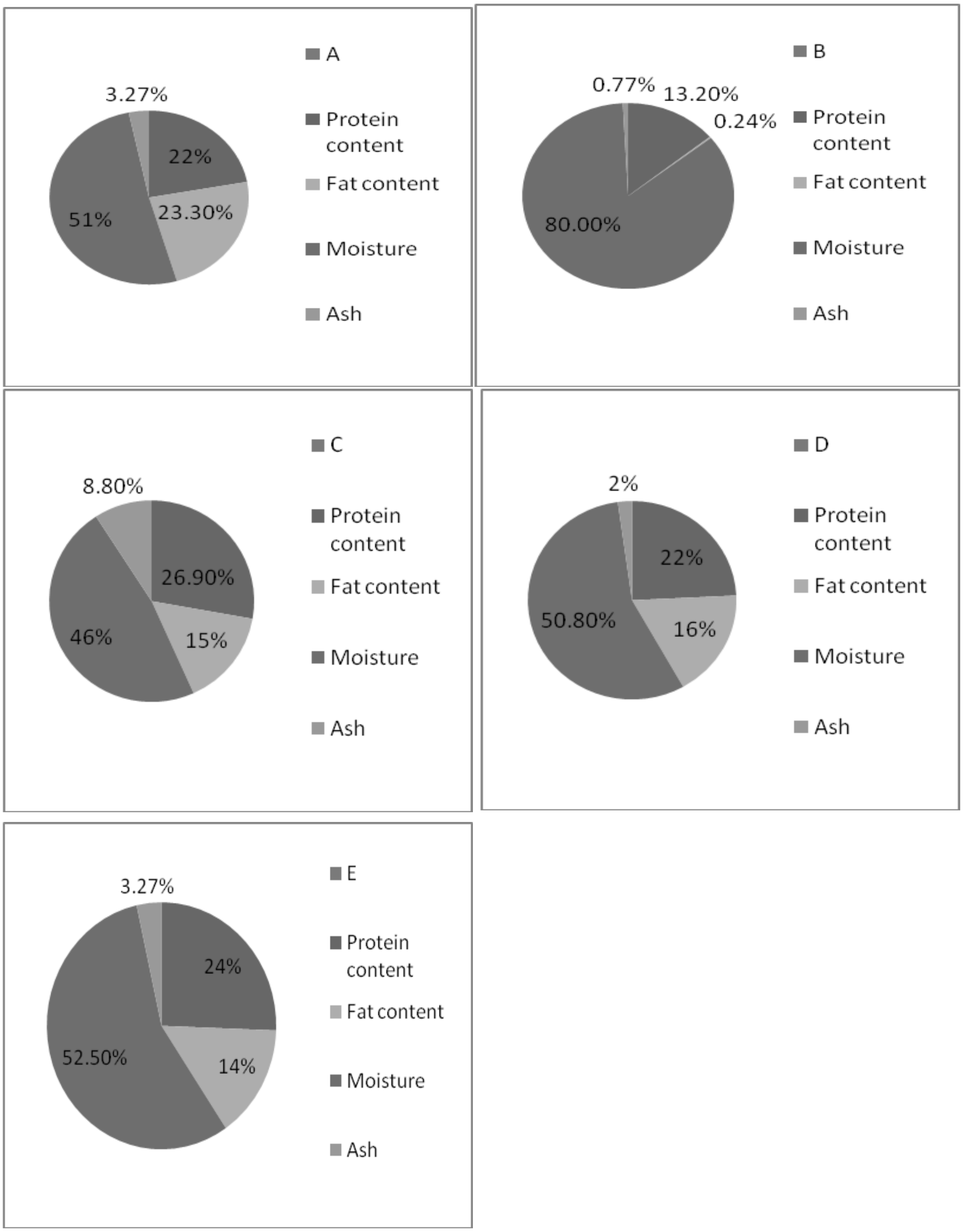

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