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Nutritive Evaluation of Edible Trash Fish: I Analysis of Mineral Composition of Trash Fishes and Their Utilization

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Abstract: The commercial and industrial catch of marine fishes generally consists of edible and inedible species. Among inedible species the bulk catch of small size fishes were also included and these small fishes were commonly referred to as trash fish. Twenty three species of small fishes from fish trash were identified and studied for their mineral compositions which were collected bimonthly from fish harbour Karachi. Minerals like phosphorus, calcium, sodium, potassium, iron and magnesium were found in the trash which were analysed by spectrophotometry, flame photometry and atomic absorption techniques. The results have been explained in relation of importance of minerals found in edible fish trash and their utilization as poultry feed and other useful byproduct.

Key words: Trash fishes, minerals, poultry feed

INTRODUCTION

The edible fishes which were caught as trash on Karachi coast were about 50% of the total marine catch, which is very high as compare to other countries as Japan, China and America consist only 5-10% of the total catch[1] it was important to point out that for the proper use of trash fish is desirable to conduct studies on its mineral composition and nutritive value.

Qudrat-I-Khuda *et al.*[2,3] conduct Biochemical and nutritional studies on East Pakistan fishes Part V. Influence of age of fish on the distribution of protein in their body; Part VII chemical composition and quantity of the traditionally processed fish. Stansby[4] estimate Proximate composition of fish. Triebold and Aurand[5] worked on food composition and analysis. Eisa and Munir[6] made a comparative study of the distribution of mineral in the fish and native food. Nikolaiva[7] worked on chemical composition and commercial utilization of shrimps. Rilay[8] studied the distribution of the major and some minor elements in marine animals, 1. Echinoderms and coelenterates. Haq *et al.*[9] studied the fish hydrolyzates and fish extracts from Teleostean fishes of the Arabian sea. George[10] observed the Biochemical differences between the red and white meat of tuna and changes in quality during freezing and storage. Beserra *et al.*[11] studied the Chemical composition of some marine fishe of the northeastern part of Brazil. Fletcher and King[12] estimated Copper, Zinc, Calcium, Magnesium and Phosphate in the gonads and livers of sockeye salmon (*Oncorhynchus nerks*) during spawning migration. Shreni and Jafri[13] studied the distribution pattern of some biochemical constituents in muscle of the common cat fish, *Heteropneustes fossilis*. Shackley *et al.*[14] observed the Vitellogenesis and trace metals in the marine teleost. Eliassen[15] studied the Seasonal Variations in biochemical composition and energy content of liver gonad and muscle of mature and immature Cod. *Gadus morhus* (L) from Balsfyorden, northern Norway. Ivor[16] studied the options for utilization of bycatch and discards from Marine. Zynudhen *et al.*[17] observed the utilization of Trawl bycatch in Gujarat (India).

As it is mentioned that sodium, potassium, calcium and magnesium are very important mineral elements of sarcoplasm of the muscular cells, intercellular fluid, blood and plasma. Trace elements are of great physiological interest as they are the part of the structure of several important organic compounds. The present studies showed that trash fish have comparatively higher values of minerals and this research provide the information about the mineral composition of 23 species of edible trash fishes, their significance in terms of nutritional value, utilization and importance.

MATERIALS AND METHODS

The Trash fish were procured from Karachi fish harbour in 2001. The collections were made twice in a month soon after the landing. The Trash fish after procuring were immediately brought to the laboratory and

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thoroughly washed with tap water then were spreaded over blotting papers to remove excess of water. The total weights of trash collected were noted. The edible species were identified by fin formula method[18,19] and each species were dried separately for mineral analysis. Ash or total inorganic elements were determined by the standard method of AOAC[20].

Sodium, potassium and calcium ions in ash were determined by flame Photometric technique. The iron and magnesium were determined by Hitachi Z-8000 atomic absorption spectrophotometer with zeeman correction.

RESULTS AND DISCUSSION

Table 1 indicated that the species belonging to the order perciformes and clupiformes are more prevalent in our coastal waters during the period May to August they were caught in young stages as trash. The species of order mugiliformes were also found but numbers of species were less. The species of order cyprinodontiformes were very rare because the species *Aphanius dispar* which has been found in the collection and is not usually found in coastal waters as it is a brakish water fish.

The total phosphorus content in fishes studied were varied from species to species, the results showed that it ranged from 17.78 mg (*C. indicus*) to 43.89 mg (*A. dispar*) (Table 2).

Phosphorus is one of the most important content which helps in the bone formation. In the muscles of fish the phosphorus occurs in the form of organic compound, phosphatide, phosphoprotein, nucletides, creatine, phosphate in enzyme and coenzyme etc. They are intermediate products of protein and carbohydrate metabolism. Some workers have reported the phosphorus content in marine fishes and marine animals.

Riley[8], Fletcher and King[12], Shackley *et al.*[1] and Qudrat-I-Khuda *et al.*[2,3] reported the phosphorus content in traditionally cured marine fishes and it ranged 4.20 to 6.78% Stansby[4] estimated the average phosphorus

Table 1: The species of edible fishes identified from trash

Order	Family	Specific name	Common name
Perciformes	Carangidae	*Caranx sexfaciatus*	—
"	"	*C. malbaricus*	Bangda
"	Sciaenidae	*Johnius axillaris*	Vathpatoboro
"	"	*j.sina*	Sueeri
"	"	*Otolithus argenteus*	Mushka, Beriali
"	Gerridae	*Pertica filamentosa*	—
"	"	*Gerreomorpha setifer*	Jerki, Jagiri
"	Sparidae	*Acanthopagrus latus*	—
"	"	*Rahdosargus sarba*	Kissi
"	"	*Crenidens indicus*	KalaKhuranti
"	"	*Crenidens forskalii*	Karo-dandia
"	Theraponidae	*Therapon jarbua*	Gingano, Barguni
"	Leiogathidae	*Leiognathus brevirostris*	Koanteri
"	Pomadasyidae	*Fomadasys sp.*	—
"	Lactaridae	*Lactarius lactarius*	Bukko
"	Gobiidae	*Gobius microlepis*	Vacho gullo
"	Engraulidae	*Engraulis hamiltonii*	Phyasa, anchovy
Clupiformes	Clupeidae	*Ilisha filigra*	Palla, Hilsa
"	Dorosomidae	*Nematolosa nasus*	Dhadhipali
"	Chirocentridae	*Chirocentrus dorab*	Khanda, kerli
"	Mugilidae	*Liza strongylocephalus*	Boi
Mugiliformes	Sphyraenidae	*Sphyraena acutipinnis*	Kund
Cyprinodontiformes	Cyprinodontidae	*Aphanius dispar*	—

Table 2: Mineral composition of edible fishes of trash (expressed in mg g^{-1} of dry wt.)

Name of species	Phosphorus	Calcium	Sodium	Potassium	Iron	Magnesium
Caranarx saxfaciatus	34.36±0.01	7.90±0.01	35.24±0.01	9.96±0.01	0.062±0.01	4.087±0.023
C. malbaricus	28.04±0.01	8.59±0.02	25.88±0.01	11.78±0.01	0.094±0.01	3.336±0.010
Johnius axillaris	35.99±0.01	6.37±0.01	44.30±0.01	6.12±0.01	0.119±0.01	4.436±0.010
J. sina	29.38±0.02	8.32±0.01	27.13±0.01	11.75±0.01	0.075±0.01	2.637±0.020
Otolithus arenteus	20.19±0.02	6.83±0.02	21.38±0.01	9.73±0.01	0.121±0.01	2.970±0.010
Pertica filamentosa	25.77±0.01	6.61±0.01	26.51±0.01	9.77±0.01	0.23±50.01	3.417±0.010
Gerreomorpha setifer	28.69±0.01	9.98±0.01	27.41±0.01	10.39±0.02	0.122±0.01	3.807±0.010
Acanthopagrus latus	24.820.01	7.21±0.01	22.91±0.02	10.67±0.01	0.083±0.01	3.182±0.020
Rhabdosargus sarba	27.07±0.03	6.38±0.01	26.37±0.01	5.14±0.01	0.222±0.01	3.261±0.020
Crenidens indicus	17.78±0.05	9.14±0.02	16.74±0.01	6.73±0.02	0.084±0.02	2.301±0.020
C. forskalii	21.02±0.01	6.04±0.01	21.02±0.01	8.19±0.01	0.117±0.01	2.709±0.010
Therapon Jarbua	38.78±0.01	7.51±0.01	33.39±0.01	5.33±0.02	0.099±0.01	3.119±0.010
Leiognathus brevirostris	27.71±0.01	7.52±0.01	26.99±0.02	4.43±0.01	0.114±0.02	2.486±0.010
Pomadasya sp	31.39±0.01	8.70±0.02	32.20±0.01	3.77±0.01	0.233±0.01	2.735±0.010
Lactarius lactarius	23.59±0.02	9.46±0.01	18.15±0.01	6.13±0.01	0.042±0.01	2.117±0.010
Gobius microlepis	18.60±0.01	6.38±0.01	18.89±0.01	13.59±0.01	0.189±0.01	2.657±0.010
Engraulis hamiltonii	20.47±0.01	6.15±0.01	12.93±0.01	7.23±0.01	0.043±0.01	1.999±0.010
Ilisha filigra	28.80±0.01	7.13±0.01	25.11±0.02	10.66±0.02	0.074±0.01	3.249±0.020
Nemetolosa nasus	25.89±0.01	7.33±0.01	21.25±0.01	10.36±0.02	0.093±0.01	3.187±0.010
Chirocentrus dorab	25.74±0.01	10.52±0.01	22.88±0.01	13.38±0.01	0.093±0.02	3.317±0.010
Liza stronglocephalus	29.54±0.02	7.32±0.03	30.29±0.03	8.86±0.01	0.053±0.01	3.938±0.030
Sphyraena acutipinnis	20.44±0.02	8.52±0.01	17.44±0.01	11.48±0.01	0.158±0.03	2.725±0.030
Aphanius dispar	43.89±0.01	6.98±0.01	49.52±0.01	8.78±0.03	0.146±0.03	3.961±0.030

content 200 mg% in commercial fishes while in trash fishes it ranges from 17.78 (*C. indicus*) to 38.78 (*T. jarbua*) mg g^{-1} of dry weight which is a good amount (Table 2).

Calcium is also a very important element for the formation of bone and it is bound partly with proteins and partly with myosin. Among the 23 species of fishes studied the calcium content is varied from 12.9. (*E. hamiltonii*) to 49.52 mg% (*A. dispar*). Qudrat-I-Khuda *et al.*[2,3] estimated the calcium content in some traditionally cured marine fishes and it ranged from 1.74 to 2.77%. Stansby[4] reported 15 mg% Fletcher and King [12] estimated in the gonads and liver of sockeye salmon during spawning and migration.

The sodium content studied is found to be in the range of 6.15 (*E. hamiltonii*) to 10.52 mg g^{-1} (*C. dorab*). Stansby[4] estimated the average value of sodium (63 mg%) in commercial fishes.

The potassium content in fishes studied ranged from 3.77 (*Pamadasys* sp.) to 13.59 mg (*G. microlepis*). The result showed that variation in potassium also varies significantly like phosphorus, sodium and calcium. The Potassium content in fishes have not been studied extensively very little literature have been found. Stansby[4] reported the average potassium value of commercial fishes as 300 mg%. The iron which is a micro-element and it is present in very small quantity was also estimated and it ranged from 0.042 (*L. lactarius*) to 0.236 mg g^{-1} (*P. filamentosa*). The result showed significant variation in iron content in trash fish. Qudrat-I-Khuda *et al.*[2,3] reported the iron content in traditionally cured marine fishes which ranged from 15 to 28 mg%.

The magnesium content in edible fishes of trash studied ranged from 1.999 (*E. hamiltonii*) to 4.436 mg g^{-1} (*J. axillaris*). There is no marked variation noted in magnesium content. Stansby[4] reported the average magnesium content in commercial fishes as 25 mg% .

Eisa and Munir[6] reported the variation in iron and magnesium content in fourteen, varieties of fishes. As it is mentioned that sodium, potassium, calcium and magnesium are very important mineral elements, these are found in the form of soluble salts in the sarcoplasm of the muscular cells and intercellular fluid, blood and plasma. Trace elements are of great physiological interest as they are the part of the structure of several important organic compounds. From the present investigation it was concluded that trash fishes contain important minerals which can utilize in many aspects such as poultry feed, food supplements and several byproduct such as fish protein concentrate, fish fertilizer and fish meal.

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