International Journal of Zoological Research

ISSN 1811-9778

Academic Journals Inc.

www.academicjournals.com

International Journal of Zoological Research 2 (2): 123-128, 2006
ISSN 1811-9778

Nutritive Evaluation of Edible Trash Fish. III: Medicinal and Commercial Use of Lipids of Trash Fish

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Abstract: The trash fish has great economic importance with reference to lipids. The total lipids was extracted by soxhelet extraction method and is further analyzed for cholesterol phospholipid and glyceride. Recent research shows the utilization of lipids (fatty acids) obtained from trash in different medicinal and commercial purposes. Results were explained in relation with utilization of trash fish oil, which caught during fishing. It was observed that lipids contain vitamin A, C, D and E which depend upon the fish species. Fatty acids from the fish also used in manufacturing of soap, fungicides and insecticides. Pharmaceuticals for coronary diseases and heat resistant paints. This investigation may be beneficial in utilization of trash.

Key words: Trash, lipids, vitamins, fungicides, insecticides

Introduction

Fishes are one of the most important group of vertebrates which benefits human beings in more than one ways. These are more common and widely distributed almost in all parts of the world. Fishery is of great importance to human beings and in addition to providing food, most of the fishing industries yield a number of by-products of commercial and medicinal point of view.

The catch of marine fishes generally consists of edible and inedible species. Among inedible species the bulk-catch of small sized fishes are also included which are commonly referred to as trash fish.

The trash fish has great economic importance, it is widely used for industrial purposes mainly for the production of several different by-products so it is desirable to conduct studies on its Lipid composition.

Ali *et al.*, (1958) studied on shark liver oil. I. Physicochemical constant and vitamin 'A' content of liver oil from sharks of the Karachi Coast. Khan and Haq (1958) worked on marine edible fishes and observed the distribution of oil and vitamin 'A' in the skin flesh and liver of edible fishes of Karachi water. Ahmad and Rehman (1966) studied the Cholesterol distribution in fish tissue. Plack and woodhead (1966) estimated the vitamin 'A' compounds of lipids in the blood of the cod *Gadus Morhua* from the arctic in relation to gonadal maturation Haq *et al.* (1974) estimated the fish hydrolyzate and fish extracts from teleosten fishes of the Arabia sea. Gopakumar and Rajendranathan (1975) detected the fatty acid composition of *Anchoviella* and *Thrissocleus*. David *et al.* (1976) found the lipid composition of slender Tuna *(Alothunnus fallai)* as related to lipid composition of their feed *(Nyctiphanes australis)* Salfi *et al.* (1976) estimated the plasma lipids in rainbow

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trout *(Salmo girneri)*. Cholesterol Phospholipid free fatty acid and triglyceride levels in a hatchery population sample. Mittal *et al.* (1976) observed the lipids in the skin of catfish; *Heteropneusteus fossilis* (Block). Ota and Takagi, (1977) have done the comparative study on the lipid class composition and the fatty acid composition of sweet smelt, *Plecoglossus altivetis* from marine and fresh water habitats. Owen and Middleton, (1977) extracted the fatty acids of the lipid of cultured herring. Craik (1978) observed the lipids of six species of shark. Nakayama *et al.* (1978) studied the muscle lipids of deep sea fishes, investigation about the lipids and their unsaponifiable matters. Phleger (1978) estimated the gill phospholipids of Amazon fishes. Mitra and Dua (1978) studied on characterization and variation in triglyceride fatty acids from *Puntius sarana* body lipid. El-Shattory (1979) have written the review of fish phospholipid. Nevemzel and Menon (1980) estimated the lipids of mid water marine fish family Gonostomatidae. Sykora and Valenta, (1980) extracted the lipids in some fishes of the salmonidae family. Tsikla and Shchepkina (1981) studied the lipid composition of the Azov Anchovy tissue during the annual cycle. Neighbors and Nafpaktitis (1982) observed the lipid composition, water contents, swimbladder morphologies and Buoyancies of nineteen species of mid water fishes. Stoll (1999) and Andrew and Stoll (2001) concluded that essential fatty acids are the good fats all over the news these days and a very hot research topic. Cannor (2000) described the importance of n-3 fatty acids in health and disease. Kremer and Joel (2000) point out the importance of n-3 fatty acids supplements in rheumatoid arthritis. Makrides *et al.* (2000) show the importance of long chain polyunsaturated fatty acid requirments during pregnency and lactation. Kher-Un-Nisa *et al.* (2001) studied the lipid and fatty acid profile of lady fish, dhoter, sua, sole aal and Khagga from Karachi Coast.

The present investigation showed that trash fish have a valuable amount of lipids varied from species to species this research also provide the information about the phospholipid, cholesterol and glyceride of edible trash fishes, their significance in term of commercial and medicinal utilization and importance.

Materials and Methods

Trash fish were procured from Karachi fish harbor in 2001. The collection were made twice in a month soon after the landing. The total lipid was extracted by the soxhelet extraction method described by Triebold and Aurand (1963). The Crude fat further analyzed into phospholipid, cholesterol and glyceride.

Phospholipid was determined by Zilversmith and Davis (1960) method. The cholesterol was estimated by the method given by Chiamori and Henry (1959).

The esterified fatty acids or glycerides were determined by the method described by Stren and Shapiro (1953).

Results and Discussion

The percentage composition of crude fat or total lipids in trash fishes showed a marked variation from species to species (Table 1). It ranged from 11.3 to 25.58% of dry weight *C. dorab* (11.3), *A. dispar* (11.35), *L. lactarius* (11.4), *G. microlepis* (11.59), *C. sexfaciatus* (14.53), *Pomadasys* sp. (14.76) *C. malbaricus* (15.69), *I. filigra* (16.47), *J. sina* (16.89), *P. filamentosa* (16.95), *S. acutipinnis* (17.0), *L. strongylocephalus* (17.39), *C. forskalii* (18.60), *O. argenteus* (18.71), *T. jarbua* (19.13),, *G. setifer* (19.61), *E. hamiltonii* (19.67), *C. indicus* (20.35), *N. nasus* (21.73),

Table 1: Mean±SD of crude fat in the trash fishes. (expressed as g g^{-1} g of dry wt.)

Name of species	Crude fat
Caranx sexfaciatus	14.53±1.2
C. malbaricus	15.69±1.1
Johnius axillaris	24.16±1.4
J. sina	16.89±1.0
Otolithus argenteus	18.71±1.3
Pertica filamentosa	16.95±1.17
Gerreomorpha setifer	19.61±1.8
Acanthopagrus latus	22.50±1.1
Rhabdoscargus sarba	25.58±1.1
Crenideus indicus	20.35±1.4
Crenideus forskalii	18.60±1.7
Therapon jarbua	19.13±1.9
Leiognathus brevirostris	25.28±1.3
Pomadasys sp.	14.76±1.6
Lactarius lactarius	11.40±1.11
Gobius microlepis	11.59±1.11
Engraulis hamiltonii	19.67±1.4
Ilisha filigra	16.47±1.6
Nematolosa nasus	21.73±2.1
Chirocentrus dorab	11.30±2.3
Liza strongylocephalus	17.39±2.5
Sphyraena acntipinnis	17.00±1.1
Aphanius dispar	11.35±1.1

Table 2: Lipid composition of edible trash fishes (expressed as mg g^{-1} of lipid)

Name of species	Phospholipid	Glyceride	Cholesterol
Caranx sexfaciatus	139.0±2.3	608±3.41	71.0±1.1
C. malbaricus	139.0±2.16	687.8±6.1	57.3±1.3
Johnius axillaris	87.1±2.3	779±4.4	55.9±1.7
J. sina	92.4±1.9	662.7±4.2	53.3±1.8
Otolithus argenteus	83.5±1.8	695±4.3	53.4±1.9
Pertica filamentosa	122.3±1.4	761±4.9	64.5±1.9
Gerreomorpha setifer	100.0±1.06	806.1±5.1	56.0±1.3
Acanthopagrus latus	107.7±1.12	804±5.7	50.4±2.0
Rhabdoscargus sarba	63.4±2.1	796±5.1	53.5±3.0
Crenideus indicus	75.1±1.8	865±6.1	55.7±2.0
Crenideus forskalii	73.0±1.16	849±3.0	60.2±3.1
Therapon jarbua	106.3±1.12	818±4.1	58.0±1.1
Leiognathus brevirostris.	83.9±1.3	806±4.1	54.1±1.1
Pomadasys sp.	152.9±3.2	657±4.7	78.3±1.5
Lactarius lactarius	182.0±3.7	614±4.6	78.7±1.1
Gobius microlepis	231.0±3.6	586.2±4.7	76.7±1.3
Engraulis hamiltonii	121.0±3.7	642±4.1	51.0±1.6
Ilisha filigra	136.3±4.1	678±3.1	66.6±1.8
Nematolosa nasus	92.16±1.1	748±4.1	41.4±1.6
Chirocentrus dorab	182.5±3.1	557±3.1	81.4±1.3
Liza strongylocephalus	129.3±3.2	724±3.1	74.7±1.1
Sphyraena acntipinnis	125.6±4.1	681±2.1	64.2±1.1
Aphanius dispar	226.9±2.0	666±4.1	105.2±2.6

A. latus (22.5) *J. axillarius* (24.16), *L. brevirostris* (25.28) and *R. sarba* (25.58), The fat content in commercial and trash fish have been studied by four different methods (Haq *et al..,* 1974) by proteolytic extraction method (3.45%); alkaline extraction method (6.71%); by aqueus extraction method (6.71%) and by dry method (6.74%). Zarin (1981) reported the total lipid of trash

fish and found it ranged from 5.26 to 6.68% (wet weight) i.e., showed aslight variation. The crude fat extracted from each species is further analyzed for phospholipid, Cholesterol and glyceride. These constituents were expresses as mg g^{-1} of crude fat extracted (Table 2). The phospholipid content in trash fishes varied from 63.4 to 226.9 mg. This showed that total lipid content is significantly varied from species to species. *R. sarba* (63.4), *C. forskalii* (73.0), *C. Indicus* (75.1), *O. argenteus* (83.5), *L. brevirostris* (83.9), *J. axillaris* (87.1), *N. nasus* (92.16), *J. sina* (92.4), *G. setifer* (100), *T. jarbua* (106.3), *A. latus* (107.7), *E. hamiltonii* (121), *P. filamentosa* (122.3), *S. acutipinnis* (125.6), *L. strongylocephalus* (129.3), *I. filigra* (136.30), *C. sexfaciatus* (139), *C. malbaricus* (139.0), *Pomadasys* sp. (152.9), *T. jarbua* (182.0), *C. dorab* (182.5), *G. microlepis* (231) and *A. dispar* (226.9), Many workers have estimated the phospholipid in various marine fishes such as Salfi *et al.* (1976) Mittal *et al.* (1976), Craik (1978), Phleger (1978) Zarin (1981) estimated the phospholipids of trash fish and reported from 0.395 to 0.739% of wet weight. The cholesterol, which is an important constituent of fat varied from 41.4 to 105.2 mg. The results showed that variation is significant from species to species (Table 2). *A. latus* (50.4) *E. hamiltonii* (51), *J. sina* (53.3), *O. argenteus* (53.4), *R. sarba* (*L. brevirostris* (54.1), *C. indicus* (55.7), *J. axillaris* (55.9), *G. setifer* (56.0), *C. malbaricus* (57.3), *T. jarbua* (58.0), *C. forskalii* (60.2), *S. acutipinnis* (64.2), *P. filamentosa* (64.5), *I. filigra* (66.6), *C. Sexfaciatus* (71.0), *L. strongylocephalus* (74.7), *G. microlepis* (76.7), *Pomadasys* sp. (78.3). *L. lactarius* (78.7), *C. dorab* (81.4) and *A. dispar* (105.2)

The cholesterol content in commercial and non-commercial fishes have been reported by Salfi *et al.* (1976) Craik (1978) and Zarin (1981) estimated cholesterol contents in trash which varied from 0.3828 to 0.5581g% of wet weight. Present results are very much similar to the reported value of trash fish as a whole. The total Esterified Fatty Acid (EFA) or glyceride significantly varied from species to species (Table 2). It ranged from 557 to 865 mg g^{-1} of extracted fat. The EFA content in edible species found is shown here in increasing order; *C. dorab* (557), *G. microlepis* (586.2), *C. sexfaciatus* (608), *L. lactarius* (614), *E. hamiltonii* (642), *Pomadasys* sp. (657), *J. sina* (662.7), *A. dispar* (666), *I. filigra* (678), *S. acutipinnis* (681), *C. malbaricu* (687.8), *O. argenteus* (695), *L. strongylocephalus* (724), *N. nasus* (748), *P. filamentosa* (761), *J. axillaris* (779), *R. sarba* (796), *A. latus* (804), *G. setifer* (806.1), *T. jarbua* (818), *C. forskalii* (849) and *C. indicus* (865). The triglycerides content in various species pf commercial and edible fishes have been reported by various workers (Salfi *et al.*, 1976; Mitra and Dua, 1978; Stern and Shaprio, 1953; Zarin, 1978) reported the triglyceride of trash fish ranging from 1.8214 to 3.8602 g% of the wet. weight.

The variation in lipid content from species to species as shown in results, may be due to the composition of fatty substance in the flesh and other parts of fish, or it may be due to the difference in species, sex, age and physiological condition of fish, their feeding habits and habitat.

Conclusions

From the present research it was concluded that trash fishes contain sufficient amount of lipids (oil) which can be utilize in many aspects such as fungicides, insecticides, Pharmaceutics for coronary diseases, heat resistant paints and also used in manufacturing of soap. Fish oils are interchangeable to some extent with vegetable oils. Fish liver oil is the main source of vitamin 'A' but in some species also contains vitamin C, D and E. Some of the lubricants and cosmetics firms also use Lipid of fish as raw material.

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