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Effects of ecological changes on the Iron levels and hazard quotient (HQ) on muscle of pelagic, demersal and *neritic* fish from Khuzestan, south west of Iran

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Key words: Iron, hazard quotient, pelagic, demersal and *neritic fish*.

Abstract

The aim of this study was research the changes of ecology on Iron levels and hazard quotient (HQ) on pelagic fish[silver carp (*Hypophthalmichthys molitrix*), big head carp (*Aristichthys nobilis*)] demersal fish[and silver pomfret(*Pampusargenteus*), Orange - spolted grouper(*Epinepheluscoioides*), Yellow fin sea bream(*Acanthopagruslatus*) and grass carp (*Ctenopharyngodon idella*)] and neritic fish[Tongue fishes(*Cynoglossusarel*) and common carp (*Cyprinus carpio*)] from Khuzestan, south west of Iran. Farmed fish sampled was prepared from the Azadegan warm water fish culture center and marine Fish sampled was prepared from fishing ports Bhrekan, Abadan and Bandar Emam, Khuzestan south west Iran. Iron concentration measured by wet digestion and atomic absorption spectrometer Perkin Elmer 4100. The results showed iron average concentrations in muscle on pelagic, demersal and *neritic fishes* to be equal were 17.69, 9.8 and 16.14 and was significantly different (P <0.05). Hazard quotients (HQ) on pelagic, demersal and neritic fishes to be equal were 0.46, 0.32, 0.42 and 0. 42. Hazard quotient in all samples was less than one and so fish nutrition no risk in terms of the amount of iron in the human body.

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Introduction

Increasing population, the development of industry and agriculture, the use of different types of fertilizers and pesticides has led to the high volume of wastewater and various chemicals, especially heavy metals are into aquatic systems (Wicker and Gantt, 1994). The research of the uptake of heavy metals in aquatic organisms due to the increasing impact of human activities and the influx of these metals in the aquatic environment has intensified. Heavy metals due to their role in biological processes as micronutrient (iron, zinc, copper, cobalt, etc.) or non-essential and toxic elements (Hg, Cd, Pb) are considered. Accumulation of metals in fish location, feeding behavior, food levels, ages, sizes and metal shelf life depends on the activities of the regulatory body Hemostasis. Iron is a heavy element abundance spread all over the world. The amount of iron in the body of the fish is about 0.005% of body weight (Oksuz *et al.*, 2011).

Iron deficiency in fish, like other animals that can cause microcytic anemia and hypochromic paleness due to anemia and shrink the size of red blood cells and also lack of vitamin B6,__decreases iron absorption. Iron salts may be a lot of eating disorders. It might even be insoluble iron phosphate minerals, vitamins and trace elements, and thus attract fish disease caused by the deficiency of vitamins and minerals (Chen and Chen, 2001).

Iron is an essential element in human nutrition in a number of biologically important proteins such as cytochrome hemoglobin and present also in the oxide-reducing enzymes. The minimum daily requirement of iron is 7 to 14 mg is estimated depending on age and sex. Pregnant women may need more than 15 mg daily. Human need 10 mg iron in daily and should be considered. Iron in building red blood cells have a crucial role and is an important component of hemoglobin makes its deficiency leads to a condition called anemia hypochromic microcytic can be in fish There is no way to control the body and removes iron, so eating too much can lead to accumulation of excess iron (Schumann, 2001).Liver damage resulting from the iron can acute or chronic about 90 percent of iron poisoning immediately 48 hours after swallowing happens. the results of the damage from the necrosis high channels in the stomach intestinal - blood vessels in the conclusion of intestinal, necrosis around is returned in the liver cells, lung bloodshed and external secretions ten curtains heart damage to the liver cells with and cells or tears observed in the volatile, cell. The limit of iron in the Food and Drug Administration (FDA) is 0.05 (Chen and Chen, 2001).

The Demersal fish, Orange - spotted grouper (Epinephelus *coioides*) has a circle body and a bit of prevarication is tight. Most of the black fish low in the water, and some of them in depth Demersal. Usually in the depths of the coastal low to medium living in the depths of the sea, but rarely 200 meters depth. Most of the young people in the estuary and feed them from fish, and mollusks, crabs and etc. Most of them are bisexual._Orange - spotted grouper a wide range of the aquaculture, mainly including the fish, shrimp and crabs (Romero, 2002). The demersal fish, Yellow fin sea bream (*Acanthopagrus latus*) has the body of the four ovals and usually long enough to. It's in shallower coastal waters; some species is on a shelf and a small number of them in fresh water.Yellow fin sea bream is carnivores and have strong teeth and can enabling feed from shells (Tang, 1987). The demersal fish silver pomfret (*Pampus argenteus*) have high nutritional value and the latter's long customers in the world. Silver pomfret feed more than zooplankton, it's of migrant fish. Seasonal, a flock of large areas of the flower 80 meters depth, but sometime showed in the depth of 200 meters. Catch it gill net and trawl gear. Its radiation in the world in the coastal waters in depth to 5 10 meters (Ride, 2004).

The neritic fish tongue fishes (*Cynoglossus arel*), language and that their eyes on the left side._Tongue fishes on a flower beds and sand on the Outer Continental Shelf life and sometimes with sand

camouflage sea bed. The fish feed crustaceans and mollusks and sometimes rarely feed of the small fish. Feed them from bottom crustacean and mollusk (Dalzell *et al.,* 1991*)*

Aquaculture production in the world in 2011 was 62700300 tons (FAO, 2013) production of farmed fish in Iran in years 2012 was 338877 tons and 154565 tons of fish related to warm water fish. Common carp is farm in bottom of warm waters (neritic) most of the countries of the world. The fish omnivore and floor nutrition (FAO, 2013). Common carp culture was 3733418 tons in 2011 year in the world and the third major species of farmed fish production (FAO, 2013). Grass carp property and good growth and Expatriates Iranian waters, the fish fully grass-fed and showed in pool wall. Culture contain in 2011 year was 4574673 tons in the world and this fish had second rank in farmed fish (FAO, 2013).Big Head one of the most important species of fish carp. This fish feed from zooplankton and show in mid water. Big head Culture was 2705436 tons in 2011 year in the world and the seventh major species of farmed fish production FAO, 2013). Silver carp due to cope with the rapid growth of the environment, food, the regime has been introduced in all over the world. Silver carp feed for phytoplankton and showed in surface water and culture was 5349588 tons in 2011 and is now silver carp is first species of farmed in the world (FAO, 2013).

Fish muscle tissue is one of the most important fish in which the concentration of iron. The food sector and effect on human health (Burger *et al.*, 2006). Hazard quotient is indicators of the pollution and its reference (Phuc Cam Tu *et al.*, 2008). With the Hazard quotient can be the potential danger resulting from each of the study for human beings. If result less than 1 (in other words of attracting less than a dose of reference) indicates that the consumption of harmful aquatic acute effect on health (Kojadinovic *et al.* 2006) Given the importance of the role of iron in human nutrition and the importance of the Hazard quotient in the health of an element of human nutrition purpose of this study risk indicators in four important marine species in the Khuzestan, south west Iran.

Materials and methods

15 samples of any marine fish, Orange - spotted grouper, Yellow fin sea bream, Tongue fishes and silver pomfret from were prepared from fishing ports Bhrkan, Abadan and Bandar Emam and 15 samples of any farmed fish, the common carp, grass carp, big head carp, and silver carp were prepared from the Azadegan warm water fish culture center. The separation of muscle tissue by a blade of steel. For muscle tissue harvested from part of muscle in the upper part of the body (under the ballet trailing) was used. Tissue obtained after the tare was executed in petri dish (glass hours) to the next step in to dry. All samples obtained for 60 to 150 minutes with the temperature 65 C to constant weight and then were removed from the inside. To digest samples was used from the wet method. First 0.5 grams of wet sample shed in a balloon 250 cc and that has been shed 25 cc sulfuric acid concentrations, 20 cc nitric acid 7 molar and 1 cc molybdate sodium solution 2 percent and a number of boiling for regularly and takes place. balloon a cooler and equipping for an hour while reflex operation carried out by the electric oven (Heating Mantle) under the Hood was heated, then the cold, and above the cooler slowly 20 cc mixed concentrated nitric acid and thick per chloric than 1:1 and while the cold water mixed, the heat was given to a white acid vapors fully fade, was cold and that's balloon, 10 cc distilled water from the top of the cooler slowly. With heating (about 100 minutes) solution quite clear, after the solution to the 100cc balloon and transferred to present volume (Farkas *et al.*, 2003).

To measure to iron 10 mL ingested solution adds with 5 mL solutions and pyrimidine karbamat ammonium 5 percent. For 20 minutes samples shaker to the elements in the form of organic metal complex solution. Then samples 2 mL methyl ketones iso, tart-butyl and for 30 minutes samples shaker. After 10

minutes in 2500 far away in the minutes will be Centrifuge elements to be transferred to the phase. after the furnace and machine EDL system and optimum apparatus atomic absorption PERKINELMER 4100 model calibration curve with the help of the elements of the elements and modifier matrix by the software 32 Win Lab tradition and the value of these elements in prepared to be measured.

Hazard quotient (HQ) through the following:
Daily to attract the iron through the relationship
DI = (Cm * IR)/ BW (Zhanga *et al.*, 2012)
DI (Daily intake): the amount of iron in the body in the aquatic consumption (micrograms to kilogram of body weight on day)
C_m (Measured consumption): the average concentration of iron measured in the context of aquatic food (micrograms to gram).
IR (Ingestion rate): seafood daily consumption rates in the study region (fish 30 g and crustaceans 3.75 grams per day)(FAO, 2005., Storelli, 2008)
BW (Body weight): body weight (70 kilograms for an adult)
Hazard quotient include
HQ = DI / RfD (Phuc Cam Tu *et al.* 2008),
HQ: Hazard quotient
RfD (Reference dose): doses of reference or a total of attracting daily limit pollution (miligram to kilograms per day)
Iron reference doses for food is 10 (micro gram to a kilogram of body weight per day) (EPA, 1997)

With the calculation of Hazard quotient might be the potential risks arising from the consumption of each of the species under study for human beings. The result of this formula if HQ is less than 1 indicates that the consumption of harmful aquatic acute no effect on health (Kojadinovic *et al.*, 2006). One-way analysis of variance ANOVA used to data analyzes.

Results

The average of Iron concentration in **pelagic, demersal and *neritic* fish** were 17.69, 9.8 and 16.14 and no significant different between them ($p \geq 0.05$). The result of iron concentration in pelagic, demersal and *neritic fishes* show in fig1.

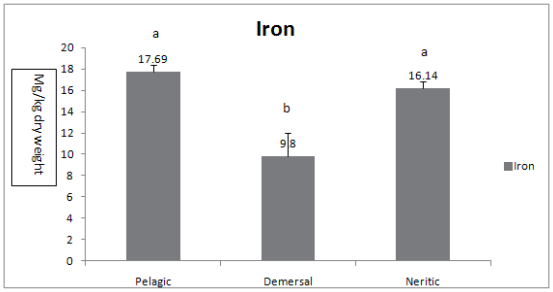

Fig. 1. Iron concentration in pelagic, demersal and *neritic fishes*.

Hazard quintet's pelagic, demersal and *neritic fishes were* 0.46, 0.32, 0.42 and 0. 42. And no significant different between them ($p \geq 0.05$). The result hazard quotient in pelagic, demersal and *neritic fishes* show in fig. 2.

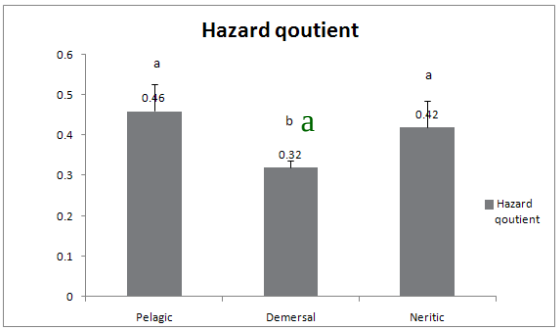

Fig. 2. hazard quotients in pelagic, demersal and *neritic fishes*.

Discussion

The results showed that the iron concentration in benthic fishes and Pelagic There were no significant differences ($p \geq 0.05$) and is above the demersal Fish's ($p < 0.05$). Any changes in the uptake and accumulation of heavy metals in fish could be due to the influence of various factors such as element type, water type, tissue, sex, weight, age, and food habits, physiological characteristics of fish and fish habitats features and environmental conditions. The most important factors affecting the concentrations of heavy metals can be habitats for fish Benthic fish that are usually in constant contact with the substrate

concentration of the heavy elements are pelagic fish are usually highest between fish metabolism and higher metabolism is the concentration of heavy metals (Oymak, 2009;). Speeding up metabolism, blood flow and the fact that most of the iron is bonded to hemoprotein accumulation Find of Pelagic Fish. (El Youssef, 2003; Ethlie Connell, 2000).

High levels of heavy metals in pelagic and neritic fish's probably to the issue returns. The results indicated that with respect to the per capita consumption of fish in Iran, 10.2 kg in 2011 (FAO. 2011) and iron concentration in the muscle studied fish examined in this study, no risk of the amount of iron in the no fish for human nutrition. In all samples HQ <1 even though the iron concentration in fish muscle is above the international standard research [FDA standards related 0.5 iron concentration in milligrams per kg fish (Chen and Chen, 2001)]. it may also create problems for fish, since the fish have lower blood levels (about 1.4% of body weight) than in warm-blooded animals (about 8% of body weight) are The main cause of iron overload in animals combined (complex) protein is The most important of these proteins are chains of hemoglobin and fruit (More than 90 percent protein, 75 percent of iron in combination with hemoglobin and myoglobin which is 7%) So overall a good source of iron to the fish to feed humans is warm-blooded animals (Paveliveva *et al.*, 1990). HQ levels vary between different groups in the survey, the highest of which is related to the lower fish Pelagic fish were Demersal. Since the HQ IS function of the iron concentration in the muscle of fish examined in this study. Its roots lie in the study of different reasons Iron accumulation is in various species.

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