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AN ASSESSMENT OF HEAVY METALS IN *TRACHINOTUS BLOCHII* (LACEPÈDE, 1801) SNUBNOSE POMPANO FISH FROM NORTHERN ARABIAN SEA

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ABSTRACT: A total 48 individual samples of *Trachinotus blochii* were collected from Karachi fish harbor during January, 2009 to December, 2009. Six heavy metals including Zn, Cu, Cd, Ni, Pb, and Cr were determined in fish samples using Atomic Absorption Spectrophotometer. The metal contents ranges were Zn= 8.23-16.495 mg/kg, Cu=6.33-8.17 mg/kg, Cd= 0.705-0.84 mg/kg, Ni= 0.575-0.61 mg/kg, Pb= 0.39-0.8 mg/kg, Cr =0.1-0.49 mg/kg. The present study indicated that the concentration of two heavy metals Zn and Cr were significant however; they were in the permissible limits of FAO/WHO.

KEY WORDS: Heavy Metals, *Trachinotus blochii*, fish harbor, Pakistan.

INTRODUCTION

Metal contamination in aquatic ecosystems is considered as a serious problem. The anthropogenic activities such as mining of metals, industrial wastes, untreated effluent, harbor activities, urban and agricultural drain are possible sources of metal pollution in aquatic environments (Dalman *et al.*, 2006). Presence of heavy metals in the marine environment damaging the biodiversity and ecosystem, due to their high toxicity and accumulative tendency in aquatic biota. As stated by Farombi *et al.*, (2007) they may have disrupting effects on the ecosystem and biodiversity.

Fish are the important part of human diet and contaminated fish are hazardous to health. They are important components of both aquatic environment and food web. Fish are directly or indirectly immensely affected by many pollutants including heavy metals. Olojo *et.al.,* (2005) reported that long term exposure in heavy metals raised morbidity of juvenile fish and decreased breeding of adults. It can pose a risk to fish consumers, such as human and other aquatic life. Several workers (Paller and Litterell, 2007) reported the preventive measures to reduce the input of trace metals into oceans, rivers and estuaries or in different aquatic systems. Saad *et al.*, (1981) stated that the low levels of the metals is the prime chemicals of the marine environment because of their toxicity and accumulation by biota (Zyadah and Chouikhi, 1999). If fish were exposed to water contaminated with high concentrations of heavy metals, the heavy metals were accumulated in the fish body, subsequently become the part of food chain and ultimately transferred into human being.

Bearing these points in mind the present study was designed to determine the heavy metal (Zn, Cu, Cd, Ni, Pb, and Cr) concentration in muscles of *Trachinotus blochii* fish species collected from Karachi Fish harbor.

MATERIALS AND METHODS

Sampling Area and Sample Collection:

Uniform sized fish samples were collected from Karachi fish harbor during January, 2008 – December, 2008. The year was divided into three seasons; Pre-monsoon, Monsoon and Post-monsoon. All the samples were properly labeled, transported to the laboratory where the length sizes were measured and kept freezing for further analysis.

The muscles (flesh) of each fish sample were dried at 105ºC until they reached at constant weight. Each dried tissue sample was ground and transferred into plastic bag. 8gm sample was taken from each bag and put into a muffle furnace at 550ºC for 4 hours. The ash was dissolved with 0.1 M HCl following Gutierrez *et al.*, (1978). The dissolved ash residue was filtered with whatman filter paper1 and 1 ml filtered solution was diluted with 25 ml distilled water for elemental analysis. Heavy metals including Zn, Cu, Cd, Ni, Pb, and Cr were determined using Perkin-Elmer Analyst model 700. One-way ANOVA was applied on data to assess whether samples varied significantly or not.

RESULTS AND DISCUSSION

Total 48 fish samples of *Trachinotus blochii* (16 samples in each season) were collected from Karachi fish harbor during January, 2008 to December, 2008. The length size in three seasons ranged as 29-31cms, 30-33cms and 29.5-31.5cms respectively (Table 1).

Table 1. Mean length (L), mean weight (W), maximum (Max.), minimum (Min.), of *Trachinotus blochii*, fishes in different seasons during (January, 2009-December, 2009) from Karachi fish harbor.

Seasons	Length (cm) Mean ±SD	Weight (gm) Mean ±SD
Pre-monsoon	30± 0.720	176± 4.757
Mon-soon	30.5± 1.24	176± 7.606
Post-monsoon	30± 0.815	176± 3.633
Total	30± 1.045	176± 5.764

The highest concentrations of different metals in three different seasons were recorded as Ni (0.61±0.274 mg/kg) in Pre-monsoon, Cu (8.17±2.752 mg/kg) in Monsoon while Zn (16.495±2.731 mg/kg), Cr (0.49±0.260 mg/kg), Cd (0.84±4.058 mg/kg) and Pb (0.80±0.471 mg/kg) were during Post- monsoon season (Table 2). Zinc ranked first with the highest value while copper ranked second. Leung *et al.*, (2008) also reported the concentration of these metals in *T. blochii* which were almost found similar with the present study. The highest concentration of zinc in fish sample may be due to that it is an essential trace metal which turns up to be fatal when the nutritional supply becomes high.

Nriagu and Pacyna (1988) pointed out that the major sources of Zn disposal were galvanized iron, bronze, paint, rubber or paper industries and steam generation power plants. At the same time, a certain extent of Zn is released into the marine coastal area by natural processes. However, Cr is one of the main components of paint, pigment and steel manufacturing and leather processing. These operations are mostly acidic and may be involve the deleterious hexavalent Cr or the less toxic trivalent form. It is based on the oxidation of ores and also the combustion of the fossil fuels and is comparatively constant in aquatic system. Goyer (1991) notified that Cr induces irritation to sensitive epithelial lining and causes ulceration. Cd can cause severe respiratory, chronic lung disease, irritation and testicular degeneration (Benoff *et al.*, 2000). Pb exposing can create a wide spectrum of health problems, covering coma, convulsions and renal defect. Ni encounters many implementations in several industries due to its corrosion resistance great endurance and durability, alloying ability and electrical conductivity. It is reported that the manufacture of alloys calculations for about 75% of total Ni consumption (Wilson *et al.,* 1986, Nriagu and Pacyna, 1988, Nicolaidou and Nott, 1989).

Heavy metal accumulation ordered as Zn>Cu>Cd>Pb>Ni>Cr. One-way analysis of variance (ANOVA) was used between seasons and fish tissues, in general all metals showed considerable variation among tissues but only Zinc and Chromium were found significant ($F=19.611$ $p<0.001$ and $F=7.767$ $p<0.05$ respectively) (Table 2). This significant relationship has been regarded as indicative for heavy metal accumulation in fish (Rejomon *et al.*, 2009). Bogatov and Bogatova (2009) have also been notified like relation to the freshwater snail in Russia. This capacity is raised by specific feeding habitat and metabolic processes, which could culminate very high concentration factor (Hamilton-Amachree, 2009). There by, it would induce a critical menace to the aquatic organisms including fish in the food web.

Table 2: Mean concentration of heavy metals in and F-value by Analysis of Variance (ANOVA) in *T. blochii* fish in different seasons collected from Karachi fish harbor.

Seasons	**Zn(mg/kg) (Mean±SD)**	**Cu(mg/kg) (Mean±SD)**	**Cd(mg/kg) (Mean±SD)**	**Ni(mg/kg) (Mean±SD)**	**Pb(mg/kg) (Mean±SD)**	**Cr(mg/kg) (Mean±SD)**
Pre-monsoon	8.23±4.058	6.33±1.747	0.81±0.402	0.61±0.274	0.45±0.310	0.1±0.114
Mon-soon	14.13±2.544	8.17±2.752	0.705±0.491	0.605±0.518	0.39±0.213	0.36±0.393
Post-monsoon	16.495±2.731	8.15±0.955	0.84±4.058	0.575±0.199	0.8±0.471	0.49±0.260
F-values	**19.611*** **	**4.160ns**	**0.007ns**	**2.616ns**	**6.833ns**	**7.767***

Note: ***= p<0.001, *= p<0.01

Table 3: Comparison of heavy metals (µg/g) of fish flesh of permissible limits for food safety based.

Element	Recommended values	Reference	Our Measured values	Recovery%	C.v%
Zn	10 mg/day	NAS-NRC 1974	13.215±4.262	132%	0.32 %
Cu	30 mg/kg	FAO 1983	7.75±2.087	25%	0.26 %
Cd	1.00 mg/kg	Malaysian Food Regulation (1985)	0.81±0.396	81%	0.48 %
Ni	0.3 mg/day	WHO 1993	0.61±0.369	203%	0.60 %
Pb	2.00	Malaysian Food Regulation (1985)	0.52±0.389	26%	0.74 %
Cr	1 µg/g	Calabrese *et al.*, 1985	0.285±0.318	28.50%	1.11 %

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