Cadmium determination in two flat fishes from two fishery regions in north of the Persian Gulf

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Heavy metals are natural trace components of the aquatic environment, but their levels have increased due to industrial agriculture, mining activities, industrial activity, shipping accident (De Mora et al, 2004). Pollution studies in the ROPME area including the Persian Gulf and the Oman Sea are extremely important because this region is shallow, semi-enclosed, and has a very high evaporation rate and poor flushing characteristics (Shepperd, 1993).

Other Iranian scientists reported the pollution from inland water (Haghighi, 2010) but our study was the first on evaluation of Cadmium pollution from northern coastal waters of the Persian Gulf, belonging to the Iranian coastlines. The aim of this study was to examine the quality of local seafood in terms of heavy metal contamination by examining the two commercial fish species, *Euryglossa orientalis* and *Psettodes erumei* through the determination of Cd concentration levels in the muscle and liver tissues of the fish, monitoring the ROPME region, and investigating the relationship between fish size and metal concentration in the different tissues of these two flat fishes.

24 samples of fish species, including *Euryglossa orientalis* and *Psettodes erumei*, have been caught from April to June 2006. These two species were collected from two fishery regions, Bandar-Abbas and Bandar-Lengeh north of Persian Gulf. The fish species were randomly collected from commercial catches that landed at the local fishing ports.

Immediately after the collection, fish samples were stored on ice in an isolated box and transferred to the reference laboratory of the Hormozgan environmental deputy. Body weight and length of fishes were measured. Then male fishes were selected and a part of the dorsal muscle and liver tissue was removed and prepared for processing. All of the samples were dried at 60 °C for 48 h in a laboratory oven (Pyle, 2005).We use MOOPAM method for samples prepartions (MOOPAM, 1999). All Digested samples were analyzed using

Flame Atomic Absorption Spectrophotometer (Varian Model- Liberty series II). Statistical analyses were done using the SPSS software (version 11.5).

The interval ranges of the length of *E. orientalis* and *P.Erumei* caught from the two stations were 24-41 cm and 31.5–58 cm and whose weight were 204-101 g and 797-2650 g, respectively. Table 1 presents the concentration range and the mean and standard deviation of Cd based on dry weight (µg g^{-1}) of muscle and liver tissues of *E. orientalis* and *P. erumei* from the two sampling areas.

Table 1: Cd concentration of *E. orientalis* and *P. erumei* tissues (µg g^{-1})

Species	Tissue	Range		Mean ± sd	
		Bandar Abbas	**Bandar Lengeh**	**Bandar Abbas**	**Bandar Lengeh**
E. orientalis	**Liver**	0.2-0.7	0.11-0.5	0.31±0.09	0.24±0.13
	Muscle	0.06-0.4	0.01-0.32	0.2±0.13	0.13±0.11
P. erumei	**Liver**	0.17-0.3	0.16-0.26	0.22±.05	0.2±0.04
	Muscle	0.1-0.25	0.05-0.18	0.15±.06	0.1±.05

Cd concentrations in the muscle and liver of *E. orientalis* in the two stations were shown to have significant differences (p<0.05). The Cd concentration of *E. orientalis* was higher in Bandar-Abbas station than in Bandar-Lengeh. The same results were found for *P. erumei*.

These results indicate that the highest Cd concentrations were generally found at station 1 (Bandar Abbas). These reflect the present environmental problems because Bandar-Abbas is an industrial region with many large factories dealing with petrochemicals, oil and gas extraction and transportation, agriculture, and production of pesticides and some activities like unmanaged shipping activities, river runoff, untreated sewage discharge by coastal settlements, and dumping of toxic and industrial wastes into the sea accent this pollution.

Concentration of Cd in the muscle and liver of the two species was positively correlated with fish length and weight. These results were similar to the results of Romeo et al. (1999) and they confirm the findings of various studies.

A significant positive correlation between body weight and length was found in all fish samples (p <0.05) (Figure 1). This positive relationship was seen for the two species and in the two stations. Muscle tissues generally have lower Cd concentration than liver tissues. This fact is probably related to the organism's biological process cycle. Many species of fish exhibited higher Cd concentrations in liver relative to those in the muscle, but levels have generally been reported to be <10 µg g^{-1} (Zauk et al, 1999).

In general, the obtained values of Cd content in muscle and liver are similar to those found in previous studies (De mora et al., 2004). The concentration of Cd detected in fish was compared with reported values for other regions in an

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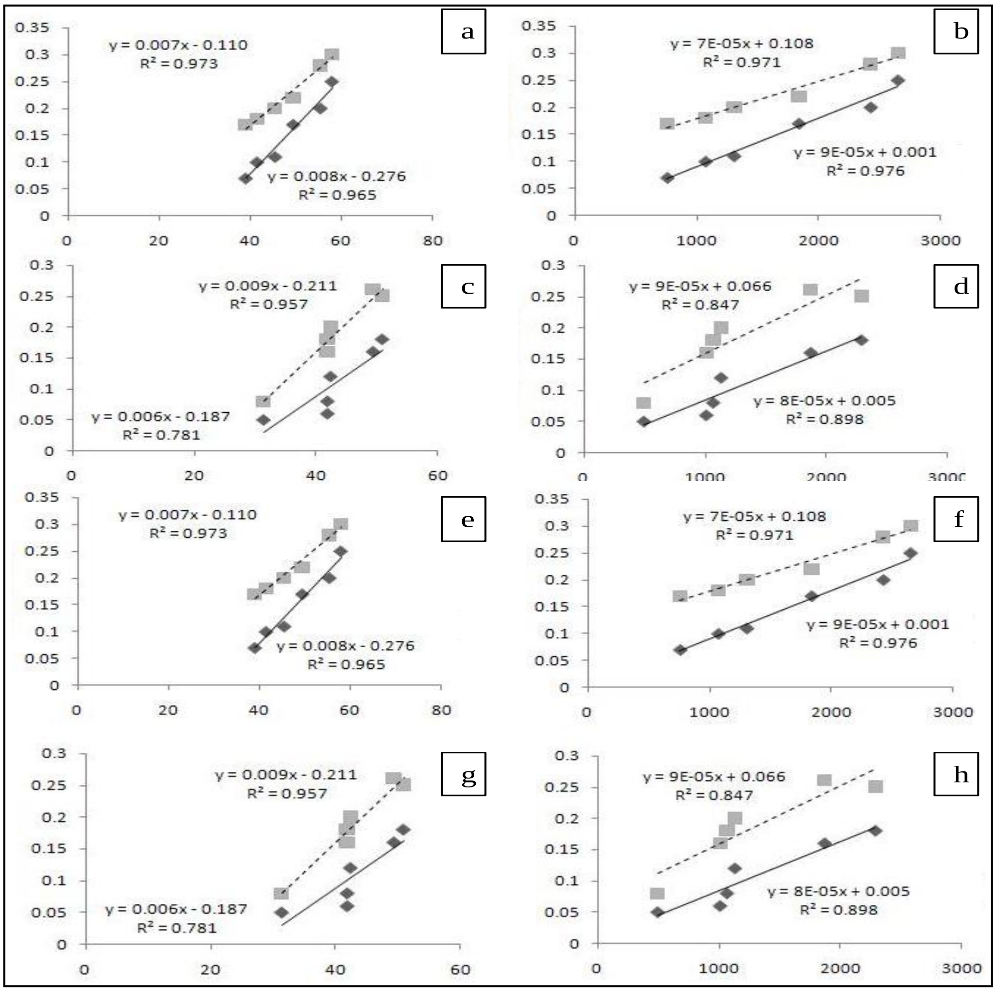

effort to determine the degree of contamination in the study area.

Figure 1: Relation between Cd concentration weight and length of *P. erumei* from Bandar-Abbasand Bandar-Lengeh station.(X axis: weight; Y axis: concentration; Liver, Muscle;a,b,e,f: Bandar-Abbas;c,d,g,h:Bandar-Lengeh)

Cd accumulation in fish caugh from the Persian Gulf was about six times more than that of Manila Bay (Maricar, 1997), 1.45 times more than that of Calcasieu River and Lake (Ramelow, 1990), but 1.5 times less than that of Gulf of Cambay (Sarvina, 2007), 6.5 times less than Iskenderun Bay (Aysun, 2008), 3 times less than Arabian Sea (Tariq, 1993), Pakistan, and 3-7 times less than Mediterranean Sea (Canli, 2003).

Comparison of metal concentrations in Table 4 reveals that the anthropogenic loading of Cd in the Persian Gulf region is relatively high. It shows that fish from the Persian Gulf were being affected by effluents from metallurgical, ship-breaking, chloroalkali industries.

This study was carried out to provide useful data on Cd concentrations in two flat fish species found in water bodies north of the Persian Gulf. Our results showed generally higher Cd concentrations in liver tissue, suggesting that metal levels of nonbiologically essential elements such as Cd in fish may increase with prolonged exposure to potentially polluting sources and thus consumption of these fishes may pose a threat to human health. The results also suggest a significant relationship between Cd concentration and length and weight of fishes, confirming the

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observation that flat fishes can be useful bioindicators of sea water pollution.

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