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ORIGINAL ARTICLE

Heavy Metal Analysis in Mud Crab *Scylla serrata* from the Coast of Visakhapatnam, Andhra Pradesh, India

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ABSTRACT
In the present study the levels of Cu, Zn, Pb and Cd in three different body parts (muscle, hepatopancreas and gill) in mud crab Scylla serrata collected from Visakhapatnam fishing harbour were determined. In this study, the selected tissues were processed through nitric acid digestion and for analysis atomic absorption spectroscopy was used. The results clearly showed that crab accumulated metal order as follows: Zn > Cu > Cd >Pb. The recorded concentrations of metals in different tissues were within the permissible limits and are safe for human consumption.
Keywords: *Zinc, Copper, Lead, Cadmium, Crabs.*

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INTRODUCTION

In any aquatic ecosystem the metal concentration is of serious concern and it leads to deleterious effects on aquatic biota, intertidal organisms and humans through food chain [1-8]. Seafood is one of the important nutritional and balanced diets and is accepted globally [9]. It has very good important nutrients such as poly unsaturated fatty acids, proteins, vitamins, many essential minerals and saturated fats [10]. Rapid industrialization and urbanization the seafood is regularly affecting with major chemical contaminants which includes Lead, Arsenic, Mercury and Cadmium [11]. Due to consumption of the metal contaminated sea foods severe health risks may arise in due course of time [12].Many of the researchers documented that marine organisms act as biological indicators for metal pollution of aquatic ecosystem. Hence the regular monitoring of aquatic fauna is at most important to assess the status of metal accumulation time to time [13-18]. The purpose of the present study is to estimate the levels of Cu, Zn, Cd and Pbin three different tissues of *Scylla serrata* from the coast of Visakhapatnam.

MATERIAL AND METHODS

The *Scylla serrata* samples were procured from the Visakhapatnam fishing harbour (17.6958° N, 83.3025° E) which is one of the major landing centers for crabs and other resources. The live crabs were purchased from local supplier and were transported to the laboratory of ICAR-Central Institute of Fisheries Technology (CIFT-Visakhapatnam). Later the collected samples were stored in refrigerator at 4^0C to minimize the metabolic activity before subjected to experimentation. The present study is aimed to establish the information on heavy metals in three different body parts, i.e. muscle, gill and hepatopancreas. Hence the required tissues were separated and weighed. Each tissue was labelled carefully and was subjected to homogenization with a grinder (Thermo Scientific D1000). The samples were oven dried at 50-60^0C. The dried samples were weighed and the powdered samples were stored in refrigeration until further analysis.

Instrumentation: The samples were analysed on atomic absorption spectroscopy in ICAR Laboratory-Central Institute of Fisheries Technology (CIFT-Visakhapatnam).

RESULTS AND DISCUSSION

The estimation of heavy metals in different tissue like muscle, gills, and heapatopancreas of mud crabs *Scylla serrata*was carried out in different months during the year 2019 from the coast of Visakhapatnam. The samples were analysed and the concentrations of heavy metals in ppm were investigated in the crab tissues. The results are shown in tables.

Muscle

The concentration of heavy metals in muscle tissue ranged from 128.93±12 to 178.21±10 ppm for Copper (Cu), 124.81±10 to 173.63±32 ppm for Zinc (Zn), 0.003±0.001 to 0.036±0.002 ppm for Lead (Pb) and 0.43±0.05 to 0.94±0.10 ppm for Cadmium (Cd) (Table 1).

Table 1. Pearson correlation coefficient for metal concentrations in muscle tissue of *Scylla serrata*

	Cu	Zn	Pb	Cd
Cu	1			
Zn	0.515954	1		
Pb	0.365444	0.15612	1	
Cd	-0.14832	0.034148	0.086504	1

Gill

The concentration of heavy metals in gill ranged from62.22±14 to 130.24±15 ppm for Copper (Cu), 99.15±19 to 136.15±17 ppm for Zinc (Zn), 0.003±0.001 to 0.027±0.008ppm for Lead (Pb) and 0.19±0.13 to 1.13±0.10 ppm for Cadmium (Cd) (Table 2).

Table 2. Pearson correlation coefficient for metal concentrations in gill of *Scylla serrata*

	Cu	Zn	Pb	Cd
Cu	1			
Zn	0.004333	1		
Pb	-0.36956	-0.28174	1	
Cd	0.135013	-0.11127	-0.40281	1

Hepatopancreas

The concentration of heavy metals in hepatopancreas ranged from51.32±11 to 98.21±16 ppm for Copper (Cu), 128.25±23 to 175.34±16 ppm for Zinc (Zn), 0.003±0.001 to 0.032±0.001 ppm for Lead (Pb) and 0.19±0.07 to 0.47±0.13 ppm for Cadmium (Cd) (Table 3).

Table 3. Pearson correlation coefficient for metal concentrations in hepatopancreas of *Scylla serrata*

	Cu	Zn	Pb	Cd
Cu	1			
Zn	0.470316	1		
Pb	0.04944	0.109849	1	
Cd	0.518401	0.740967	0.172068	1

In the present study the recorded values of Cu and Zn were in higher proportion in edible tissues compared to lead and cadmium. These study findings are well in agreement with the statement of Kamaruzzaman*et al.,*[19]. They have stated that the Cu and Zn are two prominent trace metals which are actively involved in the metabolic activities of the crab and were absorbed into the body through water and surrounding environment. They also stated that the higher concentration of Zinc in edible tissue was observed when compared to other metals. This might be due to the Zinc play a significant role in many enzymatic activities as precursor molecule. Zinc usually helps in body growth and development especially in crustaceans and this may lead to accumulation of higher concentration even in hepatopancreas. Turoczy*et al.,*[20] studied on the concentrations of Cd, Cu, Hg and Zn in muscle, gill and hepatopancreas of *Pseudocarcinus gigas.* According to them the higher concentrations of Hg and Zn in muscle tissues was noticed when compared to the concentrations of Pb and Cd. The present study findings are well in agreement with the results of Turoczy *et al.,*[20].

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