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***Research Article** (Open Access)*

STUDIES ON HEAVY METALS IN BIVALVES; BASE LEVELS OF PB, AS AND HG IN FOOT AND MANTLE OF FRESH WATER BIVALVE, *CORBICULA STRIATELLA*

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ABSTRACT
Heavy metals are constituents of aquatic environment and some of them are biologically essential.But most of heavy metals are very persistent in nature and after their release into the environment they remain in the body of bivalves for very long period. The present study is related with the basic levels of three heavy metals Mercury (Hg), Arsenic (As) and Lead (Pb) in the foot and mantle of the freshwater bivalves, *Corbicula striatella.* These heavy metals were analysed by atomic absorption spectrophotometer in the freshly collected snails from the Girna dam fro Chalisgaon (Maharashtra) in the month of January, 2006. The concentration of Hg, As and Pb in the foot and mantle of experimental bivalves was 0.002 ± 0.001$\mu g/gm$ and 0.001 ± 0.001$\mu g/gm$, 0.068 ± 0.004 $\mu g/gm$ and 0.071± 0.003 $\mu g/gm$, 0.054±0.002 $\mu g/gm$ and 0.059±0.004 $\mu g/gm$ respectively. But heavy metal Hg was not at detectable level in the foot and mantle of control bivalves. At a comparative level the concentration of As was more than Pb and Hg in this organ. The difference in the base levels has been discussed in relation to the metabolic efficiency of the foot and mantle in bivalves, *Corbicula striatella* and in relation to the environmental concentration of these heavy metals.

***Keywords**: Bioaccumulation, Mercury, Arsenic, Lead and Corbicula striatella*

INTRODUCTION

Heavy metals are known to be naturally occurring compounds, but anthropogenic activitesintroduce them in large quantities in different enviornmentalcompartments. This ability to foster life being reduced as human, animal and plants health become threatened.this occurs due to bioacuumulation in the food chains as result of the non degradable state of the heavy metals. Sewage and industrial disposal has greatly increased the addition of heavy metals in the aquatic ecosystems. Water pollution is the biggest menace of urbanization, industrialization and modern agricultural practices. It leads to alteration in physical, chemical and biochemical properties of water bodies as well as that of the environment (Indra and Sivaji, 2006). Heavy metals occur in aquatic systems from natural sources and anthropogenic activities. The pollution of aquatic environment by heavy metals affects aquatic biota posse's considerable environmental risks and concerns (Amisah *et al.*, 2009). Compared with other types of aquatic pollution, heavy metal pollutants less visible but its effects on the ecosystem and humans are intensive and very extensive due to their toxicity and their ability to accumulate in the biota (Shanmugam *et al.*, 2007; Edem *et al.*, 2008).

Excessive use of pesticides has resulted in serious ecological and environmental problems as well as health hazards (Olea and Fernandez, 2007). Many pesticides are known inducers of oxidative stress by directly producing reactive oxygen species (ROS) and impede the natural antioxidant or oxygen free radical scavenging enzyme system (Geter *et al.*, 2008).

The discharge of heavy metals by industries pose a serious water problem due to the toxic properties of these metals and their adverse effects on aquatic life. According to the survey conducted by Central Inland Fisheries Research Institute (CIFRI, 1981),these heavy metals are well kowan pollutants which are

often encountered in many rivers of India, and there is every possibility of deterioration of water quality and hence including man and various organisms are presenting a potential threat for survival. Heavy metals are recognized as a strong biotoxicants, because of their persistent nature and cumulative action to the aquaticflora and fauna (Sharma and Agrawal, 2005). Heavy metals continue to be common pollutants in quatic ecosystems and are toxic to aquatic organisms (Pesando, *et al*, 2004; Dodson, 2005; Gagneten, 2007 and Farris, 2007).In particular, the detrimental effects of Cu and Cd have been documented in numerous studies (Naimo, 1995; de Oliviera, 2004 and Pena, 2007). Bivalve and gastropod mollusks are excellent sentinel organisms for the study of toxic effects of such metals in aquatic ecosystems (Reddy, 1987; Pietrock, 2008 and Hong, 2011).

Heavy metals are natural components of the earth`s crust. They cannot be degraded. To a small extent they enter our bodies via food, drinking water and air. Heavy metals are natural components of the earth`s crust. They cannot be degraded. To a small extent they enter our bodies via food, drinking water and air. Heavy metals in the aquatic ecosystem occur in the sediments and also in the suspended particulate matter (Sastry and Shukla ,1993).

The aim of this study was to assess the toxic heavy metals Mercury , Arsenic and Lead in the foot and mantle of fresh water bivalves, *Corbicula striatella* collected from the laboratory reared controlled group and from their natural environmental inhabiting experimental group.

MATERIALS AND METHODS

Fresh water bivalves,*Corbicula striatella* were collected from Girna dam from Chalisgaon (Maharashtra) They were brought to laboratory. The foot and mantle were quickly excised and cleaned were dried at 80 ^{oc} in an oven till constant weight was obtained. The 100 mg sample was taken for digestion. The tissue was digested in 10 ml of acid mixture (HCL:HNO_3 in (3:1) ratio) on hot plate till dryness. The digested mixtures were kept in water bath for 6-7 hours until the samples were cooled. Cool digested samples were filtered (Whatman grade 541). The total volume was diluted to 20 ml by double glass distilled water in volumetric flask.The sample were analysed on the instrument atomic absorption sepctrophotometer (Chemito).The concentration of Hg , As and Pb accumulation in the tissue of foot and mantle were recorded and the results are given in the tables.

RESULTS AND DISCUSSION

Heavy metal pollutants are Arsenic, Cadmium, Copper, Zinc, Chromium, Mercury and Lead. There are various types of sources of pollutants. Natural sources like rock, rainfall, forest fire, and windblown solids partials resulting from volcanic activities continually add heavy metals in to water bodies. many water bodies which lie in vicinity of population have been polluted by effluents released by industries, factories, Power stations, domestic waste etc. which besides disturbing the quality of water also degrade the protein source in the form of fish food and limits their use (Baki *et al.,* 2011; Abdul Qadir and Riffat Naseem, 2011; Javed and Usmani 2012; Taweel *et al.,* 2012; Emere and Dibal, 2013; Fatima and Usmani, 2013).

In the present study, concentration of heavy metals Hg ,As and Pb in foot and mantle of fresh water bivalves, *Corbicula striatella* shown in table.

The concentration of Hg in foot and mantle of control bivalves is not detected but in experimental bivalve, it is 0.002 and 0.001µgm/kg respectively.As concentration in foot and mantle in control bivalves is 0.056 and 0.052 µgm/kg and in experimental bivalves it is noted 0.068 and 0.071 µgm/kg while in Pb concentration in foot and mantle is 0.47 and 0.051µgm/kg in control and 0.054 and 0.059 µgm/kgin experimental bivale respectively. The study of heavy metal concentrations in bivalves was important with respect to water pollution and biomagnifications of heavy metal salts. In the present study, the concentration of heavy metals in foot and mantle was as: As >Pb > Hg.

The accumulation of metal in different species is the function of their respective membrane permeability and enzyme system.The ratio between bioaccumulation and exposure concentration with periods of exposure has been shown by various investigators. The accumulation of several metals is due to the low

capacity of these mollusks for discriminating among metals, which are similar in some characteristics such as ionic radius. (Mitra *et al.*, 2000; Pragatheeswaran, 1987; Sayer *et al.*,1989; Barber and Sharma, 1998; Senthiloathan *et al.*, 1998; Jeffree *et al.*, 1993; Metcalfe,1994 **)**

Table 1: Mercury Arseic and Lead content (µgm/Kg dry weight) in foot and mantle tissues of control and experimental bivalves, *Corbicula striatella*

Heavy metals	Tissues	Control bivalves (µgm/kg dry weight)	Experimental bivalves (µgm/kg dry weight)
Hg	F	ND	0.002 ± 0.001
	M	ND	0.001 ± 0.001
As	F	0.056 ± 0.003	0.068 ± 0.004 (21.428 %)*
	M	0.052 ± 0.002	0.071± 0.003 (36.538 %)*
Pb	F	0.047± 0.003	0.054±0.002 (14.893 %)*
	M	0.051± 0.002	0.059±0.004 (15.686 %)*

** - % variation compared with respective control,*
F - Foot, M - Mantle

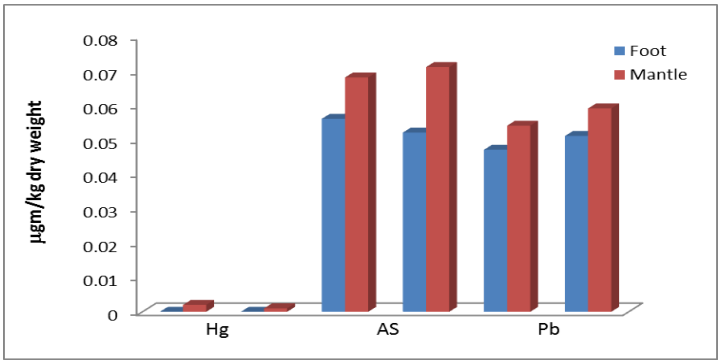

Figure 2:

Heavy or toxic metals are metals with a density at least five times that of water. They are stable elements (meaning they cannot be metabolished by the body) and bio-accumulative are (passed up the food chain to humans). These include : mercury, lead, nickel, arsenic, cadmium, aluminium, platinum and copper.Heavy metals besides micronutrients have no fuction in the body and can be highly toxic. Studies confirm that heavy metals can directly influence behaviour of living organism including man.

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