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Bioaccumulation and heavy metal induced physiological stress in the freshwater prosobranch snail *Bellamya bengalensis* (L)

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Abstract: Aquatic molluscs are ideal invertebrate model systems for monitoring environmental quality and toxicology. Heavy metal ions enter living organisms via either intake with food or uptake from surrounding water. However, wide variety of stressors including the heavy metals and adverse water quality conditions can have significant effects on animal physiology. They have been proposed and reported to cause significant ecological damage to the mollusc population through a reduction in scope of growth leading to overall small size of individuals, tissue deformities and abnormalities, mass mortalities etc,. This study reviews some of the stress evidences or biomarker responses of the molluscs against aquatic trace metals and water quality contamination. The results indicated that the accumulation of heavy metals is predominant in molluscs after induction than in water. The gastropod can accumulate different amount of metals in their tissues as per concentration and exposure period. The results were interpreted for stress physiology in the experimental animal *Bellamya bengalensis* (L) from different tissues.

Keywords: *Bellamya bengalensis*, heavy metal, bioaccumulation, stress physiology.

INTRODUCTION

All over the world, aquatic ecosystems get impacted by the mixing of chemical contaminants. The relationship of man and metal is as old as man himself. Gold, silver, copper, zinc, lead, cadmium, manganese, mercury and others have been mined for millennium. Urban runoff is well known to transport metals and other contaminants at elevated concentration [1]. Rao and Gadgil [2] reported excess presence of some metals like Cr, Cu, Ni, Zn, Cd, Pb and Hg in the aquatic environment. Heavy metals have a density above 5g/cm3. These are non-biodegradable and biaccumulated in an environment after prolonged exposure. AbdAllah[3], reported that, these metals if excessively accumulated can acts as hazardous contaminants that pose a danger to the aquatic flora and fauna. Requirement of animals for heavy metals as iron, cobalt, copper, manganese, molybdenum and zinc have been linked to growth, development, achievement and reproduction [4]. Trace metals may be derived from a number of anthropogenic and natural sources[5,6]. Salánki et. al.[7], and Luoma and Rainbow[8], reported that, trace metals have been considered as important contaminants in the aquatic ecosystems through number of organic matter with hydrocarbons, oil which has caused lethal toxicity and severe mortality in aquatic fauna. It has been reported that trace elements even at low concentrations can have hazardous effects on the ecological, bio-chemical, physiological and immunological functions of aquatic fauna Rittschof and McClellan-Green[9], Rainbow [10].Metals, like lead, arsenic, mercury, etc. are not biologically essential but, are proved toxic(Satyanarayana and Sastri,[11]. Trace metals like iron, manganese, copper, zinc, nickel, chromium, etc., found important for proper functioning of biological system and their deficiency or excess amounts in the organism can lead to number of disorders [12, 13].

Most of the Indian rivers get polluted by domestic sewage, and also with industrial wastes[14,15]. Among the different metals, namely Fe, Cu, Zn, Cd, Pb, Na, K, Ca, Mg, Sb, Co, Ni, Mn and lead (Pb) never dominated any age in history. Lead is one such heavy metal with specific toxicity and cumulative effects[16]. Several factors effect metal pollution index, as organisms comes in contact with metals from all environmental compartments due to their habitat, their feeding habits, [17].

Extreme climatic conditions such as increased temperature, reduced pH, and hypoxia can expedite the absorption and accumulation of metals in the tissues of the molluscs and symptomatically show oxidative stress, reduced growth, protein denaturation, immunosuppressant, tissue hypoxia, disease outbreak, mass mortality, histopathological abnormalities along with impaired metabolic activities[18,19] .The risks associated with heavy metal exposure are, neurological, behavioral, hematological, nephrological, skeletal, reproductive and gastrointestinal, which causes constipation, abdominal pain etc. Mohanna *et al.*[20], *and* Matozzo et. al.[21] reported that decreased pH and high temperature can strongly affect the immune-parameters in clam, *Chamelea gallina* and mussel, *Mytilus galloprovincialis*. Chandurvelan et. al.[22] documented that, considering global warming, acidification and prevalent aquatic pollution, the use of biomarkers as pollution indicators has become a common tool for environmental assessment of metallic pollution and prediction of pathological symptoms such as cell damage, cellular necrosis and relevant dysfunction of targeted system, in aquatic organisms. Recent studies reported several previously unexamined freshwater contamination and substantial role of molluscs as bioaccumulators[23,24]. Taking account of available literature, major interest of the study was to find against toxic effects of some selected heavy metals at their various concentrations on the different vital organs of freshwater snail *B. bengalensis* pertaining to development of physiological stress as experimental model.

MATERIAL AND METHODS

(A). Analysis of Heavy Metals of Water Sample:

- The water samples were collected as per standard procedures[25] from four different sites of Rajaram tank, near Shivaji University, Kolhapur (Maharashtra). The snails for the experiments were collected from same tank. Water samples collected and stored in bottles, which were

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thoroughly cleaned with 1:1 HNO_3 and rinsed several times with glass distilled water and dried in electronic oven.

- Water samples were acidified immediately after collection by mixing with nitric acid (6N, HNO_3).
- Heavy metal concentration of acidified water samples at four different sites was analyzed by A-Analyst – 300 Perkin-Elmer Atomic Absorption Spectrophotometer, with metal specific-hollow cathode lamps and auto sampler. Combustion was achieved in an Argon atmosphere. Detection of Pb and Cd were made at 283.3 and 228.8 nm, respectively, and standards were used to establish internal calibration curves for quantification. Quantification was based on comparison with external standards, method recommended by APHA[25].
- Statistical analysis of the data for heavy-metal levels was conducted by two way analysis of variance (ANOVA),
- All water samples were analyzed and results were expressed in ppm.

(B) Analysis of Heavy Metals in Various Tissues of *B. bengalensis*:

(a**)** The absorption of heavy metals by the gastropods from the water takes place relatively rapid and the rate of absorption pertaining to their concentration in the environment (Boyden and Phillips, 1981). Metals occur in aquatic media as a hydrated ions, which may form number of soluble complexes with different organic and inorganic ligands[26] . Their concentration increases gradually during the life span in the process known as bioaccumulation. Bioaccumulation is progressive increase of a toxic chemical in tissues of living organisms as organism can uptake high quantities of the toxic chemicals[27.]. Therefore, measurement of chemical contamination is of interest particularly as a public health concern[28].

(b) Selection of animals: Freshwater snails *Bellamya bengalensis* were collected from Rajaram tank near the campus of Shivaji University, Kolhapur. Snails were brought to the laboratory in polythene bags. The shells of the snails were cleaned to remove fouling algal mass and mud. After cleaning, snails were kept in a large plastic trough having 50 liter capacity for a week to acclimatize. During acclimatization, de-chlorinated water was used.

The pH of water was 7.0 ± 0.2. Every day, water was changed by removing excreta and debris. The snails were provided ample amount of ventilation and food (plants like pistia, hydrilla etc.) daily. After acclimatization for a week, healthy adult snails of equal size (23-26 mm shell height) and weight (2.8-3.5 gm) were used for experiments and by dividing into four sets. In each set about 30 individuals were kept. First for control group of snails was also maintained and was considered as Set – I: Control group of snails; Set – II: Snails intoxicated with Zinc sulphate solution; Set – III: Snails intoxicated with Cadmium sulphate solution; Set – IV: Snails intoxicated with Lead acetate solution. Exposure period for each set was up to 96 hrs.

(c) Selection of heavy metals: The following three heavy metals were selected for the intoxication to experimental snails, Zinc sulphate ($ZnSO_4 .7H_2O$); Cadmium sulphate ($3CdSO_4 .8H_2O$) and Lead acetate $(CH_3COO)_2$ Pb. $3H_2O$. All the above selected heavy metals are easily soluble in water.

Preparation of heavy metal stock solution for intoxication: AS all the three heavy metals were miscible in water, stock solutions of 9 ppm concentration were prepared for each heavy metal. For the detection of heavy metal accumulation in different organs under study, four sets of snails were prepared.

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Atomic Absorption Spectrophotometric (AAS) Method:

- Animals were intoxicated by Zinc sulphate, Cadmium sulphate and Lead acetate with their respective concentration up to 96 hrs. Exposure.
- Alive snails were selected and sacrificed. Entire animal body was removed and dissected out by breaking the shells to collect the desired organs like foot, mantle, hepatopancreas, gills and gonads.
- Required numbers of animals were sacrificed to get desired quantity of different body organs/tissues.
- Weights of wet tissues of every snail from each set were taken and kept in oven at 60ºC for drying. After complete drying, tissues were transferred to crucibles which were initially weighed.
- Crucibles of each set were kept into muffle furnace at 550ºC for 6 hrs., for preparation of ash powder.
- Ash powder was considered as sample, 100 mg of ash (sample) was acidified with 20 ml of 6N HNO_3 solution.
- After complete digestion, the mixture was filtered through Whatmans Filter paper No.42.
- Filtration was diluted up to 100 ml with glass distilled water.
- The concentration of heavy metals zinc, cadmium and lead was estimated by A-Analyst – 300 Perkin-Elmer, Atomic Absorption Spectrophotometer by using method APHA[25]. The experiments were repeated three times for avoiding the errors, and the results were expressed in mg/gm dry weight of the tissue.

OBSERVATIONS

(a).Biological monitoring or biomonitoring: Biological monitoring or biomonitoring is the use of sentinel living organisms to screen aquatic environment for metal contaminants. Moreover, it facilitates measurement of trace element concentrations even at their low concentrations in the environment. Biomonitoring method includes the estimation of the pollution level of the environment (water and sediments) by analyzing the concentrations of pollutants in the tissues of the accumulator species. Some toxic elements can be detoxified and accumulated in a non-dangerous form within the organisms.

(b) Heavy Metal Analysis of Water sample from Rajaram Tank: The data obtained from atomic absorption spectrophotometric analysis of water sample collected from four sites of Rajaram tank near Shivaji University, Kolhapur during the course of present investigation were presented in **Table -1**.

The concentration of heavy metals in water samples of Rajaram tank at four different sites were found different. It was due to differential contamination and continuous disposal of waste water and addition of some quantity of domestic and industrial effluents into the water body. It was observed that a large number of heavy metals like Cu, Cd, Fe, Zn, Pb, Mn, Cr, Hg were present in the water samples. The concentration of these metals was very little. The range of Cu concentration was from 0.002 to 0.005 ppm. The average concentration of heavy metals Fe, Mn and Cr was 1.014, 0.198 and 0.031 ppm,

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respectively. The concentration of Hg in the water sample was too less or at some sites it was not detectable.

The concentration of selected metals in water bodies as, zinc (Zn), cadmium (Cd) and lead (Pb) was very less. The average concentration of zinc was 0.620 ppm, 0.066 ppm cadmium and 0.10 ppm of lead. At a comparative level, among the heavy metals studied Iron (Fe) was highest, Cu (copper) and Hg (mercury) were lowest in concentration.

Table 1: Concentration of heavy metals (Zn, Cd and Pb) in water samples collected from four different sites of Rajaram tank in Kolhapur city.

Water sample collection sites	**Concentration of heavy metals (ppm)**							
	Cu	**Cd**	**Fe**	**Zn**	**Pb**	**Mn**	**Cr**	**Hg**
Site – I	0.004	0.094	0.556	0.492	0.077	0.094	ND	0.021
Site – II	0.005	0.092	0.449	0.329	0.117	0.226	0.033	ND
Site – III	0.002	0.028	1.658	0.967	0.086	0.451	0.049	0.028
Site – IV	ND	0.048	1.392	0.691	0.120	0.021	0.012	ND
Average concentration	0.004	0.066	1.014	0.620	0.1	0.198	0.031	0.025

N. B. 1) The concentration values of heavy metals are expressed in ppm. 2) N.D. = Not Detected.

Heavy Metal Analysis of Various Tissues of *B. bengalensis*: Different invertebrates accumulate heavy metals to different concentrations within their tissues [29]. Molluscan species in particular exhibited a successful detoxification for intoxicated metals binding them with special amino acid called metallothionin or compounds as lead carbonate forming granules or electronic dense or translucent vesicles of various sizes[30]. Three heavy metals under study were assessed for bioaccumulation in different body tissues of experimental snail *B. bengalensis.* The concentration of metals zinc, cadmium and lead against snail were documented in **Table -2.**

Table -2: Concentration of heavy metals (Zn, Cd and Pb) in various organs of control group of freshwater snail *Bellamya bengalensis*.

Name of the organ	Concentration of heavy metals (mg/gm dry wt. of tissue)		
	Zinc (Zn)	Cadmium (Cd)	Lead (Pb)
Foot	0.672	0.419	0.219
Mantle	0.309	0.392	0.169
Hepatopancreas	0.782	0.911	0.304
Gills	0.449	0.332	0.197
Gonads	0.411	0.510	0.168

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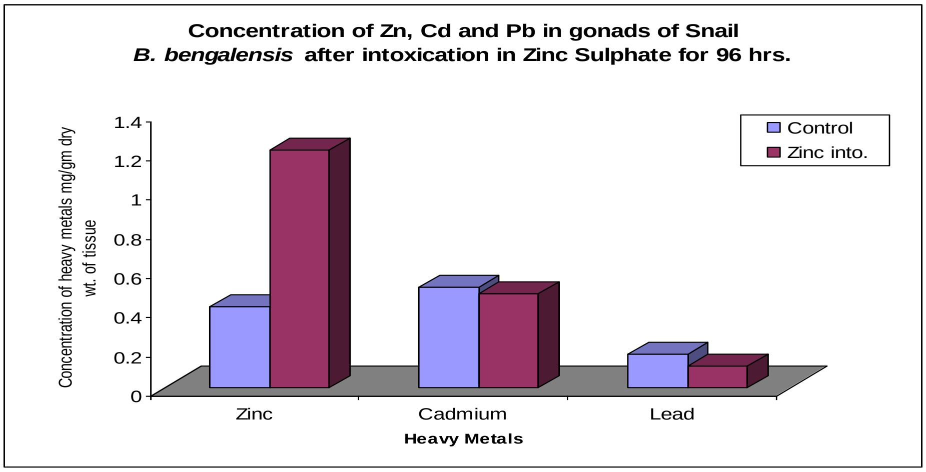
Basic levels of heavy metals (Zn, Cd and Pb) in various organs of Control group of snails (Set-I) : The basic level of heavy metal zinc in the tissues of foot, mantle, hepatopancreas, gills and gonads of control snail was 0.672 mg/gm, 0.309 mg/gm, 0.782 mg/gm, 0.449 mg/gm and 0.411 mg/gm respectively. The concentration of cadmium in foot was 0.149 mg/gm, in mantle 0.392 mg/gm, in hepatopancreas 0.911 mg/gm, in gills 0.332 mg/gm and 0.510 mg/gm in gonads in controlled group of snails. Similarly the concentration of lead was 0.210 mg/gm in foot, 0.169 mg/gm in mantle, 0.304 mg/gm in hepatopancreas, 0.197 mg/gm in gills and 0.169 mg/gm in gonads of controlled groups of snails.

Alterations of heavy metals (Zn, Cd and Pb) in zinc sulphate intoxicated snails: After 96 hrs. of intoxication to snails by heavy metal zinc sulphate, the concentration of zinc was highly increased in the body tissue. In zinc intoxicated snails the quantity of zinc was increased upto 1.724 mg/gm in foot, 1.638 mg/gm in mantle, 2.119 mg/gm in hepatopancreas, and 1.222 mg/gm in gills and in gonads it was increased up to 1.209 mg/gm dry weight of tissue. The concentration of other two heavy metals cadmium and lead had remained more or less same as in the controlled groups of snails. The highest concentration of zinc was observed in the mantle showing 81.09% in it, when compared to the concentration of other tissues.

The data of concentration of Zn, Cd and Pb in various organs of snail *B. bengalensis* after intoxication in zinc sulphate are recorded in **Table -3** and graphically illustrated in **Graph No. 01**.

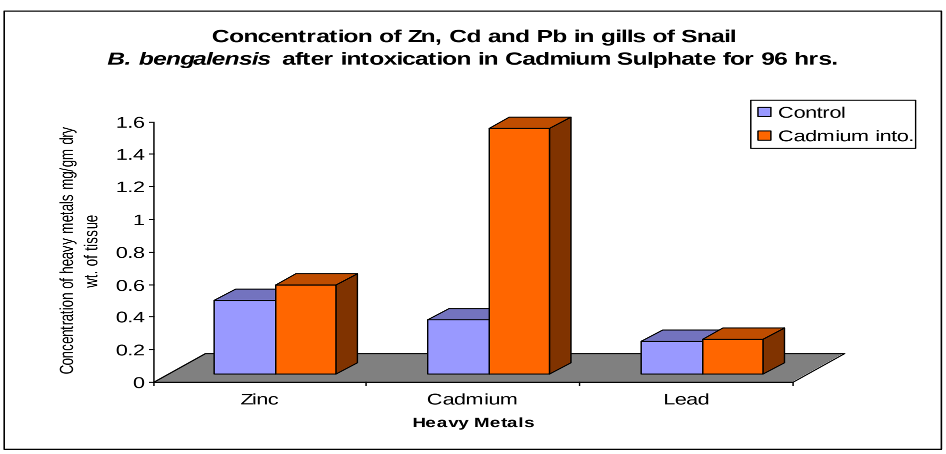
Table 3: Concentration of heavy metals (Zn, Cd and Pb) in various organs of fresh water snails *Bellamya bengalensis* after intoxication in zinc sulphate for 96 hrs. .

Name of the organ	Concentration of heavy metals (mg/gm dry wt. of tissue)					
	Zinc (Zn)		Cadmium (Cd)		Lead (Pb)	
	Control group	Expt. group	Control group	Expt. group	Control group	Expt. group
Foot	0.672	1.724 (61.02%)	0.419	0.425	0.219	0.198
Mantle	0.309	1.638 (81.09%)	0.392	0.411	0.169	ND
Hepatopancreas	0.782	2.119 (63.10%)	0.911	0.807	0.304	0.309
Gills	0.449	1.222 (63.26%)	0.332	0.345	0.197	ND
Gonads	0.411	1.209 (66.00%)	0.510	0.478	0.168	0.109



GRAPH NO. - 01

Alterations of heavy metals (Zn, Cd and Pb) in various organs of cadmium sulphate intoxicated snails: After 96 hrs. of intoxication in cadmium sulphate heavy metals concentration in experimental snails was recorded in mg/gm dry weight of tissue. It was observed that cadmium concentration in different tissues was increased extensively well, as compared to the concentration zinc and lead. Cadmium concentration was 1.954 mg/gm in foot, 1.405 mg/gm in mantle, 2.419 mg/gm in hepatopancreas, 1.510 mg/gm in gills and 1.849 mg/gm in gonads. The zinc and lead concentration was not increased but it was more or less nearer to the concentration in control group of snails. The highest concentration was found in cadmium showing percentage increase up to 78.01 %. The concentrations of Zn, Cd and Pb in various organs of snail *B. bengalensis* after intoxication in cadmium sulphate are recorded in Table No.52 and graphically illustrated in **Graph No. 02**.



Graph No. 02.

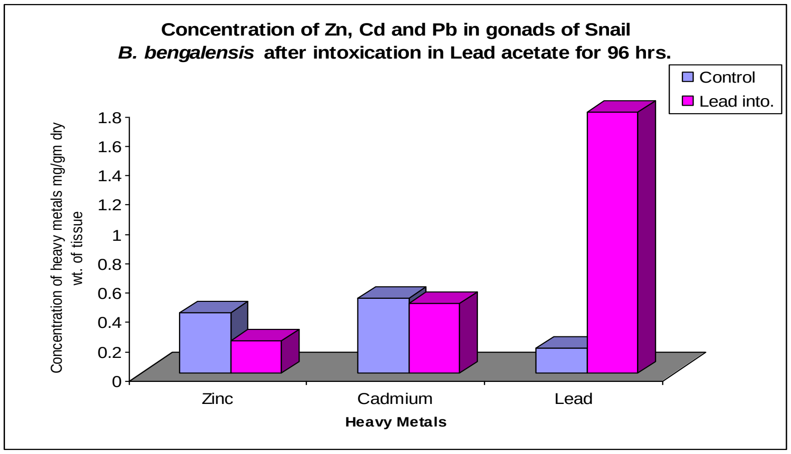
Alterations of heavy metals (Zn, Cd and Pb) in various organs of lead acetate intoxicated snails: Intoxication in lead acetate to the freshwater snail *B. bengalensis* for 96 hrs. increased the concentration lead in different organs under study. Lead is considered as highly toxic heavy metal in the aquatic organisms. After treatment the concentration of lead was 1.723 mg/gm in foot, 1.429 mg/gm in mantle, 2.301 mg/gm in hepatopancreas, and 1.810 mg/gm in gills and in gonads it was increased up to 1.772 mg/gm dry weight of tissue. Zinc and cadmium concentration was not increased in any of the organs. It was remained somewhere as that of in the controlled group of snails. The highest concentration of lead was observed in gills which showed increase in percentage up to 89.12%. The data of concentration of Zn, Cd and Pb in various organs of snail *B. bengalensis* after intoxication in lead acetate are recorded in Table **No.4 and 5** and graphically illustrated in **Graph No. 03.**

Table-4: Concentration of heavy metals (Zn, Cd and Pb) in various organs of fresh water snail *Bellamya bengalensis* after intoxication in cadmium sulphate for 96 hrs. .

Name of the organ	Concentration of heavy metals (mg/gm dry wt. of tissue)					
	Zinc (Zn)		Cadmium (Cd)		Lead (Pb)	
	Control group	Expt. group	Control group	Expt. group	Control group	Expt. group
Foot	0.672	0.720	0.419	1.954 (76.56%)	0.219	0.209
Mantle	0.309	0.219	0.392	1.405 (72.10%)	0.169	0.229
Hepatopancreas	0.782	0.510	0.911	2.419 (63.34%)	0.304	0.401
Gills	0.449	0.547	0.332	1.510 (78.01%)	0.197	0.210
Gonads	0.411	0.348	0.510	1.849 (72.42%)	0.168	0.159

Table -5: Concentration of heavy metals (Zn, Cd and Pb) in various organs of freshwater snail *Bellamya bengalensis* after intoxication in lead acetate for 96 hrs. **.**

Name of the organ	Concentration of heavy metals (mg/gm dry wt. of tissue)					
	Zinc (Zn)		Cadmium (Cd)		Lead (Pb)	
	Control group	Expt. group	Control group	Expt. group	Control group	Expt. group
Foot	0.672	0.548	0.419	0.363	0.219	1.723 (87.29%)
Mantle	0.309	0.117	0.392	0.299	0.169	1.429 (88.17%)
Hepatopancreas	0.782	0.427	0.911	0.729	0.304	2.301 (86.79%)
Gills	0.449	0.419	0.332	0.401	0.197	1.810 (89.12%)
Gonads	0.411	0.221	0.510	0.472	0.168	1.772 (90.52%)



Graph No. 03

DISCUSSION

Environmental pollution is the excess contaminant at wrong place at wrong time in wrong quantity. The extent of accumulation and the physiological half-life of the elements vary according to the induced metal species and the organism[31].Organic and inorganic pollutants accumulate in vegetation and animal bodies [32]. Generally organism can be exposed to heavy metals through uptake of water, ingestion of sediment particles and via food chains AbdAllah[33]. Heavy metals can damage both aquatic organisms and species diversity, due to their easy uptake into the food chain, accumulative behavior, bio-magnification in the food chain [34]. Heavy metals pollution in freshwater bodies was a major concern as high levels of heavy metals have been reported by several researchers George[35] Molluscs, in particular, have shown considerable promise as biomonitors against aquatic pollution[36]

Parson's[37] observed that extent of evolutionary changes were occurred in moderately stressed environments because under such conditions there is sufficient metabolic energy and genetic variability to permit these change. Although other scientists have noted hampered reproductive activity with a general decline in water quality[38-40] molluscs play an important role in aquatic food chains because they represent the primary consumers in the ecosystem. Metal concentration in any organ if exceeds a threshold level, the toxic signs start to be manifested in the exposed organism[10]. The detection of heavy metals in the aquatic environment instigated several workers to utilize bio-indicators as clams, bivalves and related molluscan species[41,42] and typically gastropods [43].

In the present investigation, base level of heavy metals was analyzed by Atomic Absorption Spectrophotometric method[25] in a local freshwater tank. It was found that the concentration of Cu, Cd, Fe, Zn, Pb, Mn, Cr and Hg was very little. Average concentration of heavy metals at four sites of Rajaram tank was Cu – 0.004 ppm., Cd – 0.465 ppm, Fe – 1.04 ppm, Zn – 0.620 ppm, Pb – 0.1 ppm, Mn – 0.198 ppm and Cr - 0.031 ppm. Fe (Iron) concentration was somewhat more than other heavy metals. The concentration of zinc, cadmium and lead was found in very less amount.

Chemical analysis of water has revealed that the quality of water in Rajaram tank was polluted due to the presence of toxic heavy metals. Bhosale and Patil[44] observed the seasonal variations in the heavy metal content of river Godavari. They found lowest and highest concentration of heavy metals in December to

June, respectively. The copper concentration was 0.99 mg/lit in month of December. Rao and Gadgil [2] detected the percentage of Cu, Ni, Zn, Cr, Pb and Hg into the waste water samples. They also observed inhibited BOD because of increased heavy metal concentration in animal body. Sahu *et al.*[45] detected the seasonal variations of the trace metals in drinking water from different source in Bhubaneswar.

In the present investigation, accumulation of heavy metal zinc, cadmium and lead were determined in different organs of snail *Bellamya bengalensis* (Lamarck). These metals were absorbed from the surrounding water. The concentration of zinc, cadmium and lead in foot, mantle, hepatopancreas, gills and gonads in the controlled group of snails are recorded. The highest accumulation of heavy metals – Zn, Cd and Pb was observed in hepatopancreas showing their values 0.782 mg/gm, 0.911 mg/gm and 0.304 mg/gm, respectively. Similar observations were recorded by other investigators. The accumulation of heavy metals from the surrounding water by bivalve molluscs was relatively rapid and it was closely reflected to the ambient exposure levels [46]. Chaudhari and Hazra[47] studied four species of bivalve and observed accumulation of zinc, copper and lead in the proportion of Pb > Zn > Cu.

We observed that accumulation of heavy metals was dependent on the period of intoxication. Intoxication of snails in zinc sulphate showed 61.02% increase of zinc in foot, 81.09% in mantle; 63.10% in hepatopancreas; 63.26% in gills and 66.00% in gonads. But the concentration of Cd and Pb was not increased in these organs. Similarly intoxication of snails in cadmium sulphate showed increase of this metal 76.56% in foot; 72.10% in mantle; 63.34% in hepatopancreas; 78.01% in gills; and 72.42% in gonads. Gupta and Pandey[48] also observed increase in Cd when gastropod snail *Viviparus bengalensis* was exposed to heavy metal cadmium chloride.

Lead acetate intoxicated snails showed accumulation of this metal in different tissues. Lead concentration was increased upto 87.29% in foot; 88.17% in mantle; 86.79% in hepatopancreas; 89.12% in gills and 90.52% in gonads. It was observed that comparatively, lead was more concentrated in different tissues. But the concentration of Cd and Pb was more or less to that of their concentrations in snails of control group. Similar observation was recorded in gastropod *Mactra luzonica* and *Mactra mera* by Chaudhari and Hazar[47]. The main target organs were hepatopancreas and gills, where the concentration of these metals was found highest. Chaudhuri et *al.*[47] observed the accumulation of heavy metals Pb, Zn and Cu in the bivalve *Meretrix meretrix.* Bu-olayan and Thomas[49] observed copper and lead accumulation in digestive tubules affecting the biochemical constituents of a gastropod snail *Cetithium scabridum.* Madoz-Escande,[50] found Cd and Zn accumulation in the terrestrial gastropod *Helixaspersa*. Khalid *et al.*[51] found accumulation of Cu, Zn, Pb and Cd in the digestive gland, gills and reproductive organs of gastropod snail *Levantia hierosylima*. Gupta and Pandey[48] observed maximum concentration of Cr, Mn, Ni, Pb, Cd and Zn in various tissues of snail *Viviparus bengalensis* due to their higher concentration in aquatic body.

CONCLUSION

Entry of heavy metals into the aquatic organisms can be attained either though uptake from inhabiting water or through intake with food. The metal uptake is achieved via several processes including endocytosis, membrane channel and passive ligands. Digestive gland considered as major site of metal accumulation in aquatic animals. Accumulated metals are either metabolically active or stored in the tissues as granules. The toxicity of metals is related to its metabolically activeness, rather than to the

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stored form which may cause cellular necrosis, widening of tubular cavity or presence of vacuoles at digestive cells.

In the present investigation we found that due to bioaccumulation, bioconcentration and biomagnifications of three heavy metals – zinc, cadmium and lead in the different organs such as foot, mantle, hepatopancreas, gills and gonads. The snails were remarkably found under stress seeing loss of normal mobility and normal courtship behavior in the intoxicated trough. the rate of mortality of this snail was also high. In the nature, if by any way water get contaminated by heavy metal cause severe damage to faunal diversity leading to change in ecological balance.

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