Short Communication(NS-4)

LEAD AND CADMIUM ACCUMULATION IN FRESH WATER FISHES *Labeo rohita* AND *Catla catla*

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ABSTRACT

Releases of heavy metals into atmosphere contaminate the aquatic system. When these metals are absorbed by the absorbing living material and ultimately crosses the limit then these metal acts as a toxic. Such contamination deteriorates the water quality and which leads to high rate of fish mortality. 30% of the total wastewater is used for aquaculture or irrigation purposes. The rest 70% of the wastewater is directly discharged into the Bay of Bengal, which pollutes the total estuarine region, and subsequently reduces aquatic biodiversity, causes large-scale deaths of fish seeds. The culture practice of fish is basically a composite system using different species of fish, which utilize different ecological niches of pond ecosystem. The poly-culture practices followed in waste-water fed fish farms are indian Major Carp, (i.e. *L. rohita, C. catla and C. mrigala*). These metals can pose a significant health risk to humans, particularly in elevated concentrations above the very low body requirements.

Key Words: Bioaccumulation, Aquaculture, *Labeo rohita, Catla catla,* Fish cultivation, Human health.

INTRODUCTION

During the last century Fish cultivate in ponds managed for wastewater aquaculture in the East kolkata wetland is a practice developed and refined by farmers and local communities. These fisheries were distributed through out the wards of Bhangor, Bidhannagar, sonarpur and Tiljala[1]. Traditionally, aquaculture in the EKW was dominated by the production of Indian Major Carp specially a polyculture of rohu (*Labeo rohita*) catla (*catla)* and mrigal (*Cirrhinus mrigala*).

Metal bioaccumulation has been one of the public health concerns in waste-fed aquaculture, especially in polyculture systems in which various species of fish are stocked to fully utilize the available niche of the environment and all the available energy resources derived from the waste materials[2].

Site of Study

The study was carried out in a sewage-fed farm "The East Calcutta Fisherman's Co-operative Society" situated at the Eastern Metropolitan Bypass near the Kasba connector ($22^0$30'N, $88^0$25'E).

MATERIAL AND METHODS

For the present investigation, *Labeo rohita, Catla Catla* of 2 different body weights (50g and 1000g) were collected from these ponds and the tissues were analysed for the quantitative accumulation of the metals in them. Tissues were dissected out and wiped dry and weighed accurately to 1g each for acid digestion, following to the procedure[3]. Samples of fish tissues were taken in Borosil hard glass test tubes. For each gram of the sample, 5 ml of conc. HNO_3 acid was added and then digested overnight at room temperature. The mixture was placed in a hot plate at 85 $\pm 5^0$C and 5 ml (3:2 conc. Sulfuric acid : Perchloric acid)was then added to it. The digestion was carried out until the mixture turned into a transparent solution. The mixture was cooled and filtered through an acid soaked filter paper and was adjusted to the required volume with distilled water. Metals were detected in atomic absorption

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Table 1: Accumulation of Cadmium in Fish Tissue

S/N	Tissues	Body Weight of Fish (g)	
		50	**1000**
1.	*Labeo rohita*		
	Muscle	3.30	3.63
	Liver	3.26	3.52
2.	*Catla Catla*		
	Muscle	3.34	3.42
	Liver	3.51	3.49

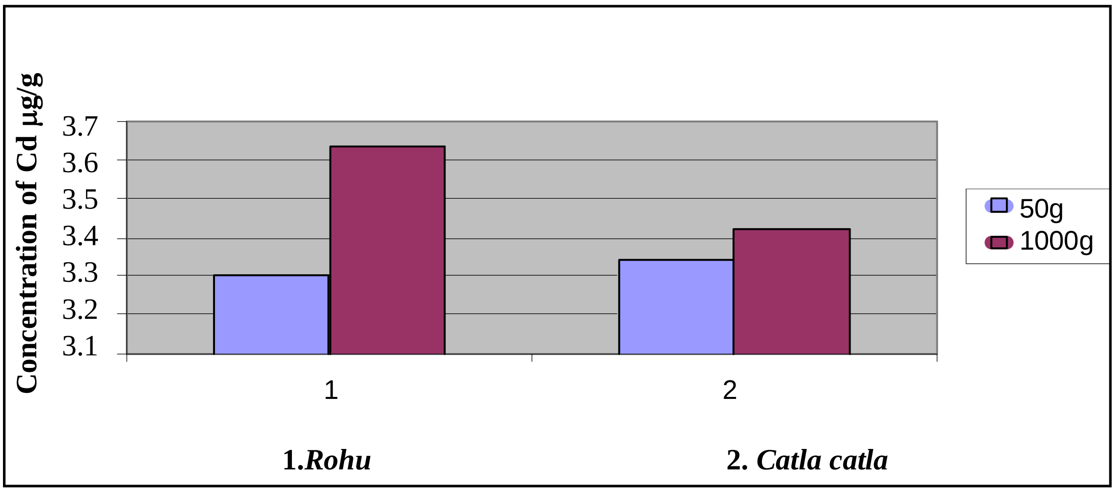

Fig 1: Accumulation of Cd in Muscle 50g and 1000g Body wt

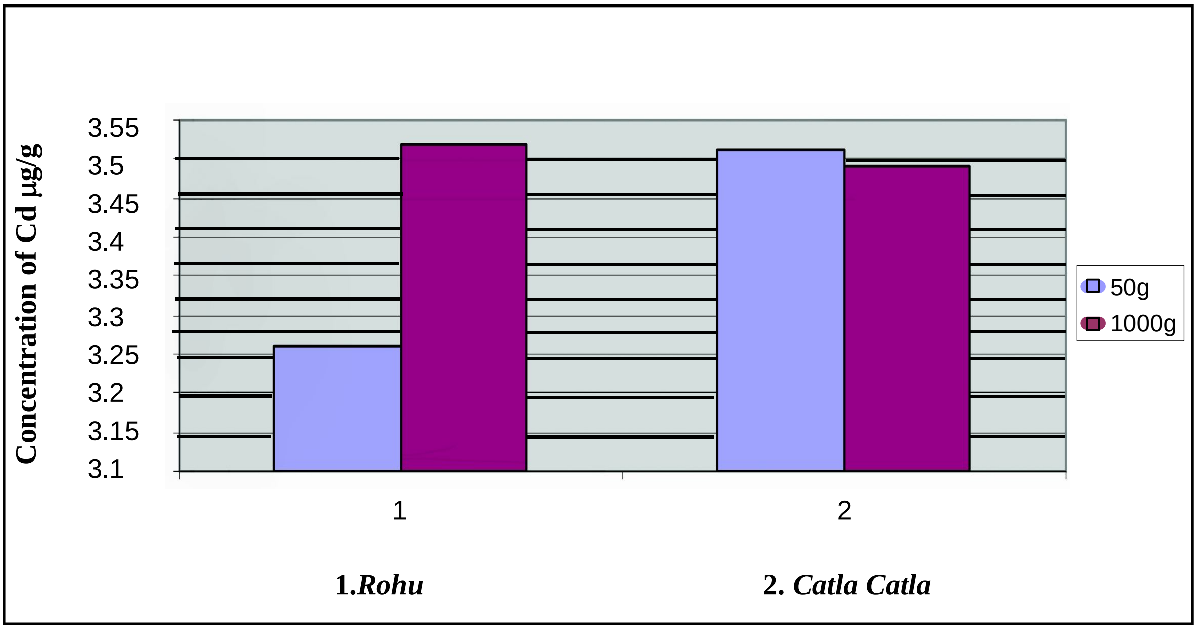

Fig 2: Accumulation of Cd in Liver 50g and 1000g Body wt

Table 2: Accumulation of Lead in Fish Tissues.

S/N	Tissues	Body Weight of Fish (g)	
		50	**1000**
1.	*Labeo rohita*		
	Muscle	49.38	52.23
	Liver	52.52	54.88
2.	Catla Catla		
	Muscle	46.20	54.02
	Liver	43.80	49.38

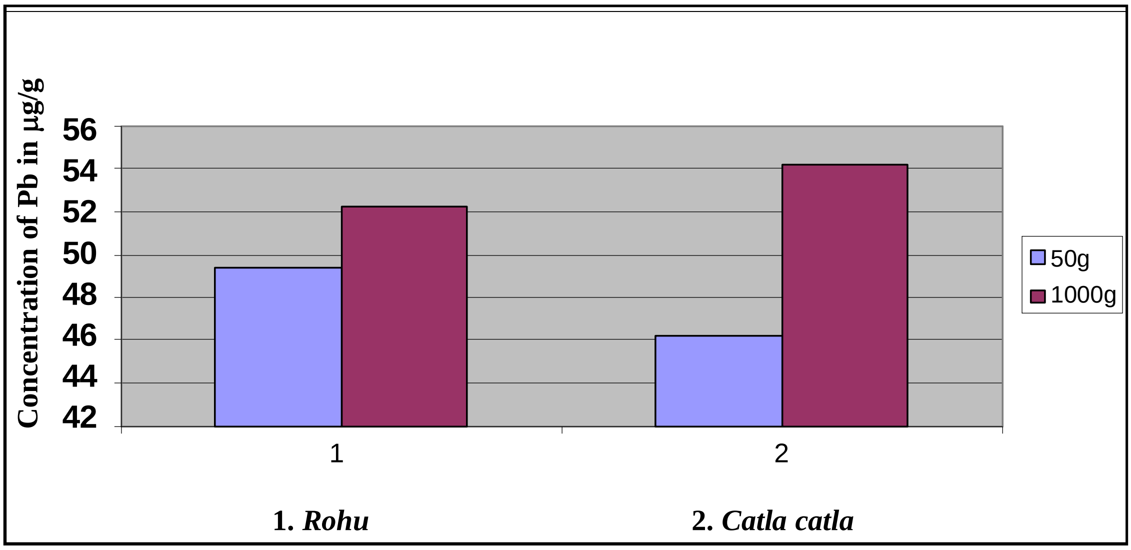

Fig 3: Accumulation of Pb in Muscle 50g and 1000g Body wt

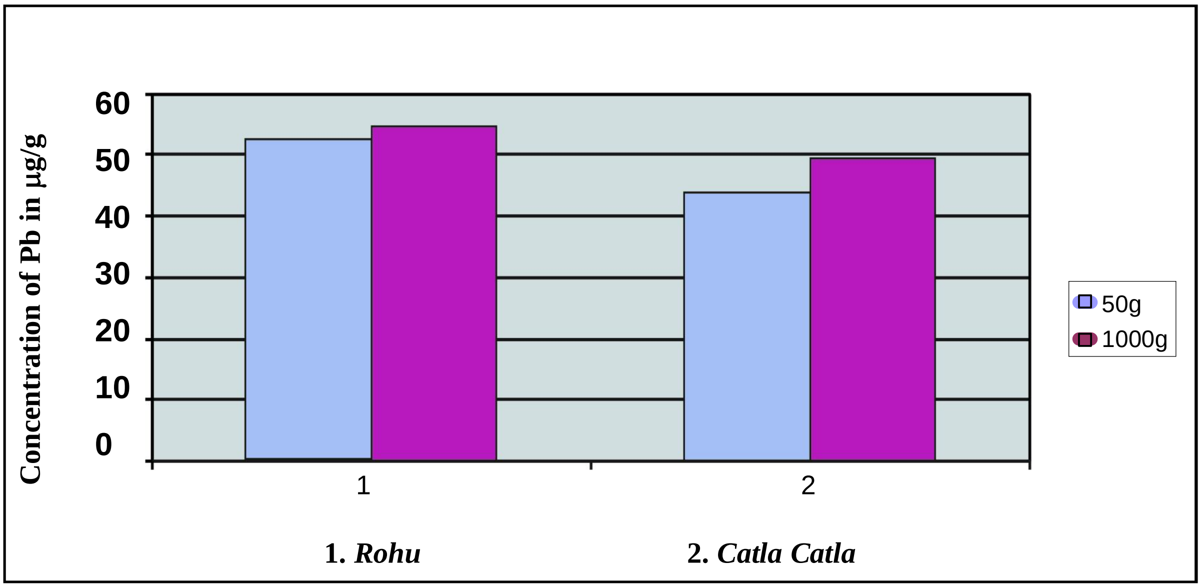

Fig 4: Accumulation of Pb in Liver 50g and 1000g Body wt

spectrophotometer (Varian AA.575).
The actual concentration was calculated on the basis of total amount of the sample taken and expressed in µg/g.

RESULTS AND DISCUSSION

Cadmium and Lead accumulation show insignificant variation among the body weight however, As in **Table 1** and (**fig. 1** and **fig. 2**) in C. catla, an increased accumulation of Pb is evident in 1000g of body weight (58.20 µg/g).
Pattern of Cd and Pb accumulation do not very significantly in the different tissues of the fish under study[4]. Although according to some authors[5,7] liver and kidney are the main site of storage for these metals. Low level of Cd induce MT formations but with chronic exposure, Cd binding capacity of MT decreases. Thus low accumulation of the metal in the tissues in possible due to the binding of the metal with thionein molecules with its subsequent depuration forms the organs. Cd uptake in non-linerar and the accumulation factor decreases with is increasing concentration in water[6].Pb, do not induce MT formation in tissues. In the present study, in **Table 2** and **(Fig. 3** and **Fig. 4)** Pb accumulation do not vary significantly with age which is in contradiction with the observation of[8] who opines that liver, kidney and scales are the main site for Pb accumulation. Accumulation of metals in the different components of the food chain, depend on the availability of the metal in both water and sediment. Difference in bioaccumulation in the tissues of the organism is dependent on their physiological activities. Cadmium is a toxic to virtually every system. It is almost absent in the human body at birth, however accumulates with age[9,10]

CONCLUSION

In the present study, insignificant variation in accumulation of Cd and Pb among two species suggests that feeding habbit and trophic status exert little influence on the accumulation.The above analysis on the issue of the debate between conservation of environment and economic development reveals some crucial points for consideration, fundamentally arguing to look into the debate beyond loss of environment and in terms of livelihood perspective of the marginal poor, who depend on natural resources. The shrinking of EKW can be seen as a process of environmental degradation that lowers the potential of production and integration of rural poor into urban economy through diversification of livelihood strategies. To stop pollution and to prevent metal-toxicity in a fish there is a clear need for an overall waste treatment strategy with the goal of elimination of priority pollutants at source. Thus from the above study we can conclude that wastewater fed fisheries pose no additional threat to the metal accumulation in fishes as compared to freshwater fed fish ponds in these localities. Resource recovery systems on the other hand are a revenue earner.

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