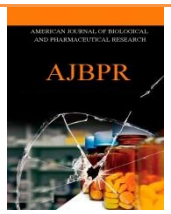
e - ISSN - 2348 - 2184
Print ISSN - 2348 - 2176

AMERICAN JOURNAL OF BIOLOGICAL AND PHARMACEUTICAL RESEARCH

Journal homepage: www.mcmed.us/journal/ajbpr



CONCENTRATION OF HEAVY METALS (TOXIC) IN AQUATIC PLANTS AND ANIMALS (MAINLY EDIBLE FISHES) OF HASDEO RIVER OF KORBA DISTRICT OF C.G. STATE

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Article Info

Received 25/03/2014
Revised 15/04/2014
Accepted 28/05/2014

Key words:- Hasdeo river, Chhattishgarh State.

ABSTRACT

The Hasdeo river is the backbone of Korea, Korba, and Champa-Janjgir district of C.G. state. Chhattisgarh State is a growing industrial state. The thermal power plant located at Korba (CSPGCL, NTPC, LANCO, ARYAN) the aluminium plant located at same place and iron ore industries located and MB Papper Mill at Janjgir Champa district of (C.G.). All these industries are capable of altering the natural qualities of air and water. The industries are of such dimension that their impact can be experienced even at distance overt 100 Km away from them. Like most of the tropical rivers, the Hasdeo also has a vast floodplain area which forms a good breeding gound for the fishes. The Hasdeo river also provide good climate for growth of aquatic plants. Hydrological factors of that river increase intensity of fishing.

INTRODUCTION

There are many villages and township situated in the bank of Hasdeo River and important edible fishes in Hasdeo River in recent past is a matter of concern for the fishery scientists. The present work was undertaken to investigate the cause of fish stock decline in Hasdeo basin in relation to negative impact posed by heavy metals like zinc, copper and lead in the ambient media. The concentration of these selected heavy metals in the body tissue of some commercially important edible fishes has been studied to assess the degree of pollution in the ambient aquatic environment and simultaneous analysis of the concentration of these heavy metals in the ambient media was also performed.

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EXPERIMENTAL `

The study was carried out considering Korba, Sarvamangala, Champa-Janjgir and other downstream as sampling station situated at the lower stretch of Hasdeo River in Korba and Janjgir district of chhattishgarh state.

That area receives a wide variety of industrial wastes generated by the industries like Thermal Power Plants, Alluminium Plants, Coal fields, and other small industries situated on the bank of the river Hasdeo.

The entire network comprised the sampling of water, sediment, aquatic plants and fish samples for detecting the concentration of heavy metals. Water sample was collected in TARSON bottle, 1ml of 0.1% $CuSO_4$ solution was added to bottle as a fungicite and algicite, and passed through 0.45 micron Millipore membrane. The filtered sample was treated with diethyl-dithio-carbamate and extracted in carbon tetrachloride. The extract was evaporated to dryness and the residue was mineralized with 0.1 ml of concentrated HNO_3. Analytical blanks were prepared and treated with the same reagents. Analysis was done in triplicate by direct aspiration to GBC Atomic

Absorption Spectrophotometer (Varian Model AA 575). The recommended operating conditions, followed during the AAS estimation.

The analytical procedure for the metal analysis in the sediment sample was the dilute (0.5 N HCl) acid treatment for the determination of biological fraction of the total trace elements and the concentrated HNO_3, $HClO_4$ and HF digestion for the determination of total metal concentrations. All analyses were done in duplicate by direct aspiration into air-acetylene flame of GBC Atomic Absorption Spectrophotometer (Varian Model AA 575). equipped with a simultaneous background corrector. The results obtains were expressed in µg/l.

For all fish samples, soft parts were carefully removed after quick rinse with double distilled water and oven dried at 100^0C. The metal contents of the dried samples were estimated after acid digestion following standard method using the Atomic Absorption Spectrophotometer as used for water and sediment analysis.

RESULTS AND DISCUSSION

The water sample showed high value for zinc concentration followed by lead and copper. The metal in the sediment accumulated in the order Sn > Zn > Cu > Ni > Sb> Pb (table 1). In sediment, the total concentration of zinc is 11.85 ppm but the biologically available portion of zinc is 5.1 ppm which is 43.04% of the total zinc. In case of copper present in the sediment and for lead the biologically available fraction is 26.09% of total lead concentration.

The accumulation of the selected heavy metals was not uniform in all the edible fish species, rather species specificity was observed, which may be due to difference in the degree of membrane permeability (table 2).

Table 1. Sample analysis

Sample	Zn	Cu	Pb
Water	0.941 µg/l	0.12 µg/l	0.50 µg/l
Sediment (biologically	14.85 µg/gm	7.75 µg/gm	0.225 µg/gm
available)	5.9 µg/gm	2.87 µg/gm	0.1 µg/gm

Table 2. Accumulation of the heavy metals in the edible fish species

Edible Fishes	Zn µg/gm	Cu µg/gm	Pb µg/gm
Glossogobius guris	7.11	0.50	0.007
Apocryptes bato	14.74	5.37	0.009
Mastacembelus armatus	4.24	1.118	0.005
Cynoglossus punticeps	4.44	-------	0.009
Eutropiichthys vacha	5.23	0.677	0.004
Gudusia chapra	7.66	4.116	0.003

Result of analysis showed that the order of accumulation Zinc is Apocryptes bato > Gudusia chapra > Glossogobius guris > Eutropiichthys vacha. > Cynoglossus punticeps > Mastacembelus armatus >

The order of accumulation Copper is Apocryptes bato > Gudusia chapra > Mastacembelus armatus > Eutropiichthys vacha > Glossogobius guris > Cynoglossus punticeps.In case of Lead the order is Apocruptes bato = Cynoglossus punticeps > Glossogobius guris > Mastacembelus armatus >> Eutropiichthys vacha > Guduysia chapra.

The considerable accumulation of the selected heavy metals in the edible fishes tissues sampled from lower Hasdeo belt highlights the magnitude of stress posed by these heavy metals in the system. Hence proper control and monitoring of these metals at the point and non-point sources are extremely important to keep the health of the ecosystem intact. So Thermal Power Plants, Coal Mines, Papper Mill release high concentration of trace/ toxic elements which distribute in water, sediments and transfer to aquatic plants and edible fishes. Humane being can't be exception and it depends upon different degree of interaction which again depends upon the localities and different climatic and geographic conditions.

Dispersion of Heavy metals cause health problems especially when it gets inside the lungs.

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