STUDIES ON SELECTED HEAVY METAL POLLUTION ON FRESH WATER FISHES FROM KRISHNA RIVER NEAR IBRAHIMPATNAM (MD) KRISHNA (DT), ANDHRA PRADESH

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Abstract: In the present day we estimated the selected heavy metal pollution in Krishna river near Ibrahimpatnam mandal, Krishna District, India and their acute toxicity and further analysed its toxicological effects on commonly consumed fresh water fishes at Ibrahimpatnam region. Two species (Labeorohita and cyprinuscarpio) were selected and collected from local market for the study. Fresh water samples were collected from 3-5 places and analysed for their essential and heavy metal by using Atomic Absorption Spectrophotometer. The fish meat samples are also investigated spectrophotometrically for their glycogen, total lipid, and protein content. Moderate to high concentrations of heavy metals were found in meat collected from fresh water fishes.

Keywords: Heavy metals, glycogen, pollutants, toxicity.

Introduction: Along with all the environmental pollutions, pollution of water resourcesisa matter of great distress. Poor and developing countries are at high risk due to lack of waste water treatment technologies. Increasing contamination of aquatic sources with large number of pollutants is not only endangering the aquatic biota but creating a worldwide shortage of recreational waters (Rai*et al*., 1998). The water of aquatic sources gets polluted by domestic activities, mining activities, municipal wastes, modern agricultural practices, marine dumping, radioactive wastes, oil spillage, underground storage leakages and industries. But the major culprits causing the pollution of water resources are different industrial units. Indiscriminate discharge of toxic chemicals through effluents from a wide range of industries into water bodies pollutes these resources and causes hazardous effects on flora and fauna (Singh and Singh, 2004; Gavrilescu, 2004; Akar and Tunali, 2005). Heavy metals to a small extent they enter our bodies via food, drinking water and air. As trace elements, some of these heavy metals (e.g. copper, selenium, zinc) are essential to maintain the metabolism of the human body. However, at higher concentrations they can lead to ill effects. Heavy metal poisoning could result from drinking-water contamination, high ambient air concentrations near emission sources, or intake via the food chain. Heavy metals are dangerous because these tend to bioaccumulation. Compounds accumulate in living systems when these are taken up and are stored faster than these are broken down (metabolized) or excreted.

Materials and Methods:

Samples collection: Two species of fresh water fishes, Cyprinuscarpio and Labeorohita from Krishna River at Ibrahimpatnam mandal near ferry, Krishna (Dt), Vijayawada, India. Were collected and selected for monitoring the effect of water born metal pollution. Water sample from above site were also collected for determination of heavy metal pollution in present aquatic resources. Collection of water was made during fishing by fisher man in the depth of 3 to 5 feet in aquatic resources. Five sample of each fish were analyzed for essential and non-essential metal and their biochemical profile were estimated for nutritional quality.

Equal weight of two fishes tissues muscles was taken were washed with double distilled water and put in sterilized Petri dishes to dry at 120°C in oven until they reached a constant weight. One gram of each dried tissue muscles were then digested with diacid (HNo_3 and $HClO_4$ in 2:1 ratio) on a hot plate set at 130°C until all materials were dissolved. Digested samples were diluted with double distilled water appropriately in the range of the standards, which were prepared from the stock standard solutions of the metals (Merck). The metal concentration in the samples was measured using an Absorption Atomic Spectrophotometer (AAS). Water sample were digested in the same manner for the detection of pollutant toxic metals. Macronutrient elements were determined in fish meat samples by Spectrophotometry in laboratory and reported in g kg and results of micronutrients were given in .Glycogen (Joseph and Robert, 1966) Total lipids and Protein were estimate using standard Biochemical method Lowry *et al.,* (1951).

Table 1: Analysis of water resource samples:

Water Resources	Macronutrients (μgL^{-1})					Trace Metals (μgL^{-1})					
	Mg	Na	Ca	K	P	As	Pb	Cd	Hg	Zn	Ni
Krishna River water Samples	25±8.0	42±14	28±6	40±11	16±4	22±5	15±2	6±1	3±1	13±1	11±3
Recommended Levels (current mA)	20	40	25	35	10	10	10	3	1	5	20

Table 2: Analysis of fresh water fish samples

Water Resources	Macronutrients(mg Kg^{-1})					Trace Metals ($\mu g\ Kg^{-1}$)					
	Mg	Na	Ca	K	P	Ag	Pb	Cd	Hg	Zn	Ni
Labeo rohita	17±1.2	50±1.3	22±1.52	38±1.25	10±1.2	4±0.26	5.8±0.12	3.1±0.15	4±0.25	7.9±0.02	1.5±0.06
Cyprinus carpio	17± 3	65± 2	21± 2	42±1	9±1	3±0.015	7±0.06	2.5±0.21	4.1±0.22	10±2.6	1 ±0.02

Table 3: Biochemical analysis of fresh water fish samples (gm Kg^{-1})

Samples	Glycogen	Lipids	Proteins
Labeo rohita	0.062± 0.003	25.96±3.05	5.26±0.09
Cyprinus carpio	0.089±0.002	21.50±1.29	3.92±0.06

In addition it is a significant step to identify the level of toxicants and their effects in the organism. Such things might lead to show various changes in metabolic functions such as behavioral, growth, reproduction and survivality (Ata et al., 2009). This can result in changes in fish health and reproduction that may alter fish population. The Table 2 showed the concentration of macronutrients in fresh water fish of Ibrahimpatna mmandal. The values of macronutrients evaluated with literature. An increase in concentration of K, Na or Mg contents in water (Table 1) may alter the efficient changes in fishes. Table 3 showed bioaccumulation potential of heavy toxic metals in two species under investigation and compared with international literature. The concentration of Pb in Cyprinuscarpio and Labeorohita showed significant difference. Hg concentration in muscle of two fresh water species was higher. Cadmium (Cd) as an ion affects on respiration and binders in exchange of gases (Gulfaraz and Ahmed, 2001). In fresh water fish Labeorohita the highest level of protein was reported as compared to other fish; Cyprinuscarpio was more tolerant to heavy metal stress. Table 3 showed that nutritional composition of fresh water fish under studied which may be related with water body condition. Glycogen content in muscle was investigated as a biological monitoring tool for assessment of effect of heavy metals present in water to that of the value of glycogen content in species. Lipid content in muscles were inversely related level of As, Hg and Pb. Investigation showed that appreciable decline in the biochemical profiles such as total glycogen, total lipids and protein contents of the fish in presence of toxins, results in decrease productivity of fish population. The results are in agreement with Ranbhare and Bakare, 2012.This study reflects the extent of the toxic effects of toxic metals at various functional stages in the widely consumed freshwater fish. The toxicity of heavy metal caused the glucose level to decrease with increase of pollutants concentration. Statistical data analysis showed significant difference in macro elements of fresh water. Whereas biochemical parameters of fish belongs to different aquatic resources showed variation in glycogen, lipids and proteins.

Conclusion: In the present study it may be concluded that concentration of heavy metals in fish of Ibrahimpatnam region is a matter of serious fact because eventually its accumulate in human body and can cause damages in human body. Hence, heavy metals in the tissues of aquatic animals have to be intermittently monitored. Therefore it is recommended that River Water metal management required measuring the potential toxicity of metals-contaminated effluent at its point of discharge to

avoid the influential effects of toxic metals in high quality food. Otherwise changes in fish health due to pollution may decline in fish population and shows its unhealthy effects on human race.

References:

1. *Jagruthi.M, Devika Y.S,* Role of Aqueous Leaf Extract of Psidium Guajava L. on Spermatogenesis and Sex Hormones in Male Albino Rat; Life Sciences International Research Journal , ISSN 2347-8691, Volume 2 Issue 2 (2015): Pg 289-301
2. Rai AK, Upadhay SN, Kumar S, Upadhya YD, (1998) Journal IAEM,(25) :22-51
3. Singh, P. and I.S. Thakur (2004). Removal of colour and detoxification of pulp and paper mill effluent by microorganisms in two step bioreactor. J. Scientific Indus.Res., 63, 944-948.
4. *M.L.S. Gboku, F. Kobba, A. Johnson,* Rethinking Extension Strategies for Enhancing ; Life Sciences international Research Journal , ISSN 2347-8691, Volume 2 Issue 1 (2015), Pg 223-231
5. Gavrilescu M. (2004). Removal of Heavy Metals from the Environment by Biosorption. Engineering in Life Sciences,4 (3): 219–232.
6. *Jayshree Jatwa, Manju Junwal,* Studies on Human "Thyroid Disorders": ; Life Sciences international Research Journal , ISSN 2347-8691, Volume 2 Issue 1 (2015), Pg 236-239
7. Akar, T. and S. Tunali, 2005. Biosorption performance of Botrytis cinerea fungal by-products for removal of Cd(II) and Cu(II) ions from aqueous solutions. Miner. Eng., 18: 1099-1109.
8. *Pardha Saradhi Pavuluri, Sudhakar Ch, Lakshmi Narasu Mangamoori,* investigation of Anticancer Effect of Novel ; Life Sciences international Research Journal , ISSN 2347-8691, Volume 2 Issue 1 (2015), Pg 218-222
9. Joseph H. Roe, Robert E. Dailey. (1966).Determination of glycogen with the anthrone reagent.Analytical Biochemistry, 15(2): 245-250.
10. Atsushi Hara, Norman S. Radin .(1978).Lipid extraction of tissues with a low-toxicity solvent Analytical Biochemistry, 90(1): 420-426.
11. Lowry OH, Rosebrough NJ, Farr AL, Randall RJ.(1951).Protein measurement with the Folin phenol reagent. J Biol Chem. 193(1):265-75.
12. *Shehla Ishaque, Saroj Karare, Durre Shahwar, Ranjana Vasundria,* Diversity and Abundance of Wetland Birds ; Life Sciences international Research Journal , ISSN 2347-8691, Volume 2 Issue 1 (2015), Pg 232-235
13. Ata S., Moore F. and Modabberi S., (2009). Heavy metal contamination and distribution in the Shiraz Industrial Complex Zone Soil, South Shiraz, Ir *Kanimozhi .S, P. Subramanian,* Nutrient Rich Potting Mixture for Terrace Gardening; Life Sciences International Research Journal , ISSN 2347-8691, Volume 2 Issue 2 (2015): Pg 302-305an. World Applied Sciences Journal 6(3):413–425.
14.
15. ATSDR (Agency for Toxic Substances and Disease Registry), (1993).Toxicological Profile for Cadmium Atlanta, US.Dept. of Health and Human Services, Public Health Service.
16. *Dr. Shailja Acharya,* Diet Overlap and Food Competition Among Three ; Life Sciences international Research Journal , ISSN 2347-8691, Volume 2 Issue 1 (2015), Pg 240-244
17. Rafia Azmat, Farha Aziz and Madiha Yousfi, 2008. Monitoring the Effect of Water Pollution on Four Bioindicators of Aquatic Resources of Sindh Pakistan. Research Journal of Environmental Sciences, 2: 465-473.
18. Ranbhare VS and Bakare RV.(2012). Effect of Heavy Metal Pollution on Fresh Water Fishes Proceeding of International Conference SWRDM
19. *C. Malarvizhi, P. Subramanian,* New Plant Growth Regulator formulation for Improving the tomato Crop; Life Sciences International Research Journal , ISSN 2347-8691, Volume 2 Issue 2 (2015): Pg 306-309

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