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Research Article

SUBLETHAL STRESS OF LEAD NITRATE AND COPPER SULPHATE ON BIOCHEMICAL CONTENT IN HEPATOPANCREAS AND GONAD OF A FRESHWATER SNAIL, *BELLAMYA BENGALENSIS*

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ABSTRACT
Effect of sub lethal concentration of lead nitrate and copper sulphate on hepatopancreas and gonad of aquatic snail, Bellamya bengalensis was evaluated.The analysis for 7, 14 and 21 days exposed snail was made in the present work. The amount of biochemical components was greatly influenced by lead nitrate and copper sulphate. This causes depletion in ascorbic acid level significantly in exposure to both heavy metals'.

Key Words: *Lead Nitrate, Copper Sulphate, Bellamya Bengalensis, Ascorbic Acid*

INTRODUCTION
Heavy metals are recognized as a strong biotoxicants, because of their persistent nature and cumulative action to the aquatic flora and fauna (Sharma and Agrawal, 2005). In the aquatic invertebrate, Beaby and Eaves (1983), observed that mollusks can accumulate higher concentration of metal ions than other groups of invertebrates. Among the heavy metals copper is important metal which is mostly used in the industries, paints and ceramics. The fertilizers are the main sources of copper, zinc and mercury which cause the pollution to the different media (Simkiss, 1984; Crop and Morgan, 1991). Intoxication of copper reduces growth, survival and rate of reproduction in the aquatic invertebrates. Nanaware (1975) repeated the data on histochemical and biochemical changes in some gastropod snails.

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). The biochemical changes in the organs of animal exposed to heavy metals have no definite pattern and the physiological state of metabolic activity of an organism reflects in the utilization of their biochemical energy to counteract toxic stress. The biochemical changes occurring in the body gives the important indication of stress (Peter, 1973).

Drinking water may be contaminated with arsenic from arsenical pesticide, natural mineral deposits or improperly disposed arsenical chemicals. However, elevated arsenic level in drinking water is the major cause of arsenic toxicity in the world. Reports of arsenic contamination in water are available from more than 30 countries in the world. However, the major regions affected are in the river basin of the Ganga, Brahmaputra and Meghna in India and Bangladesh with an estimated 25 million people in Bangladesh and 6 million people in West Bengal, India exposed to arsenic contaminated ground water (Chakraborti *et al*., 2002). Mercury discharged into the environment throught effluent and solid waste routes, contaminating the adjucent aquatic and terrestrial ecosystem respectively.The secoundly contamination occurs through the chimney from the mercury cell house into the atmospheare and it's fallout by the process of precipitation. Industrial discharges occure Bothe's effluent and solid wastes and causea hazardous effect on living organisms (Agarwal and Kumar, 1978).

The present work was undertaken to investigate its biochemical changes in hepatopancreas and gonad due lead nirtae and copper sulphate in a snail, Bellamya bengalensis.

MATERIALS AND METHODS

Fresh water gastropod snails, *Bellamya bengalensis* were collected from of Suki dam which is about at the distance of 31 K.M. away from Savda City of Maharashtra State. First they were made acclimatized to laboratory condition for 2-3 days . The water in the aquarium was changed regularly after every 24 hours. After the acclimatization, The healthy active snail's of approximately medium size and weight were chosen. These snail's were divided into three groups, such as group A,B and C . The snail's of group A were maintained as control. The snail's from group B were exposed to chronic concentration (LC 50 value of 96 hr/10) of heavy metal salt, lead nirtae (6.753 ppm) and the snail's from group C were exposed to chronic concentration (LC 50 value of 96 hr/10) of heavy metal salt, copper sulphate (0.041 ppm) upto 21 days. During experimentation snail's were fed on fresh water algae. The hepatopancreas and gonad of snail's from B and C group's were collected after every seven days and tissues of hepatopancreas and gonad were dried in oven at 75 0C to 80^0C till constant weight was obtained and blended into dry powder. Ascorbic acid contents from dried powders of different tissues of control and experimental animals were estimated by using hydrazine reagent (Roe, 1967) to observe efficacy of heavy metal salts.

RESULTS

Ascorbic acid contents in different tissues of *Bellamya bengalensis* after exposure to lead nirtae (6.753 ppm) and copper sulphate (0.041 ppm) have been summarised in table's 1 and 2.

Table 1: Ascorbic acid content in selected tissues of *Bellamya bengalensis* after chronicexposure to heavy metal salt, $PbNO_3$

Treatment	Sr No.	Body Tissue	The ascorbic acid content (%) ± S.D. 7 Days	14 Days	21 Days
(A) Control	i	H.	1.430 ± 0.0007	1.410 ± 0.0007	1.390 ± 0.0129
	ii	G.	0.960 ± 0.001	0.960 ± 0.0007	0.950 ± 0.0008
(B) 6.753 ppm $PbNO_3$	i	H.	1.340 ± 0.0037*** - 6.772•	1.260 ± 0.0015*** - 11.904•	1.180 ± 0.0008*** - 17.796•
	ii	G.	0.870 ± 0.0010*** - 10.344•	0.830 ± 0.0030*** - 15.662•	0.760 ± 0.0007*** - 25.0000•

Table 2: Ascorbic acid content in selected tissues of *Bellamya bengalensis* after chronic exposure to heavy metal salt, $CuSo_4$

Treatment	Sr No.	Body Tissue	The ascorbic acid content (%) ± S.D. 7 Days	14 Days	21 Days
(A) Control	i	H.	1.440 ± 0.0007	1.420 ± 0.0008	1.140 ± 0.0004
	ii	G.	0.950 ± 0.0001	0.940 ± 0.0008	0.940 ± 0.0007
(C) 2.150 ppm $CuSo_4$	i	H.	1.320 ± 0.0049*** - 9.923•	1.220 ± 0.0106*** - 16.393•	1.060 ± 0.0011*** - 29.357•
	ii	G.	0.820 ± 0.0005*** - 19.512•	0.790 ± 0.0007*** - 22.784•	0.690 ± 0.0004*** - 39.130•

H – Hepatopancreas; • - Compared with respective A; N.S.- Non Significant; G – Gonads * - P < 0.001**

That the ascorbic acid contents in hepatopancreas and gonad of *Bellamya bengalensis* in presence of lead nirtae and copper sulphate decreased with the increase in exposure period as compared cotrol. The ascorbic acid content is more decresae those snail's exposed in copper sulphate as compared to those exposed in lead nirtae. Therefore after studies the effect of caffeine on heavy metal it is proved that ,The caffeine posseses binding site to connect heavy metal salts and due to this effect of heavy metal is less in animals those exposed in caffeine as compared to those exposed only in heavy metal salts.

DISCUSSION

The change in biochemical composition of an organ due to heavy metal stress indicates the change in activity of an organism . It reflects light on the utilisation of their biochemical energy to counteract the toxic stress. Heavy metal salts affect the metabolism of the fresh water bivalve's, *Corbicula sriatella*. Alterations in metabolic pocesses, following exposure to heavy metal stress have been always used as an indicator of stress. But there is a vast difference in the pattern & metal induced physiological alterations from metal to metal & animal to animal .

Ascorbic acid (Vitamin C) is essential for the normal developement and in most species it is produced endogenously; Thus, resembling a hormone Glucose and other hexoses convertible to glucose serve as the starting material for biosynthisis of ascorbic acid. During biosynthesis carbon chain of glucose underwent invertion of configuration and the intact chain of glucose is converted into ascorbic acid (Burns, 1956). The outstanding chemical property of the vitamin C is it's reversible oxidation reduction between ascorbic and dehydroascorbic acid.

Shanta and Motelica (1962) considered that the concentration of ascorbic acid in tissue depends on physiological state of fish, *Mugil dussumieri*. The reports on changes in ascorbic acid content after heavy metal stress on shails are scanty, in teleost fishes. Jadhav *et.al.,* (1996) observed the ascorbic acid content of various tissues of the bivalve, *Corbicuala striatella* which showed depletion over control during actute and chronic exposure to carbaryl. In present study, in the *Bellamya bengalensis* the ascorbic acid contents in the selected tissues was decreased in chronic concentration of lead nitrate and copper sulphate as compared to the control.

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