Original Research Article

Bioindicators of biodiversity

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Abstract

Disturbances in biodiversity will disturb the ecological functions of fauna as well as ecosystem. Biodiversities are the indicators of environmental changes. Due to use of heavy metals the biodiversity of water bodies affected a lot this will lead to environmental problems. To ensure our future, it is important to conserve biodiversity so must conserve our biodiversity by protective measures of vitamins in order to get rid of heavy metals.

Key Words: Vvitamins, conserve, biodiversity, heavy metals.

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INTRODUCTION

Heavy metals occur in all ecosystems of the world and their total concentration in soil and water, however varies at local regional and continental scales (Ernst, 1974; Allan, 1995). Once the toxic substances enter into the body they damage and weaken the mechanism concerned leading to the physiological, pathological and biological disorder (Bais and Arasta, 1995, Mulley *et al.*, 1996, Arasta *et al.*,1999). Cadmium, a non-essential heavy metal has been listed in the "Black list" of European community (Mason,1996). It has also been classified as b-class (soft) metal. It is a non-biodegradable element with no known biological functions and is reported to be a major contaminant of aquatic ecosystems, causing adverse effects on aquatic organisms. It enters into aquatic ecosystems through diverse sources including both natural and anthropogenic activities. It enters into aquatic bodies through sewage sludge and with the run off from agricultural lands as it is one of the major components of the phosphate fertilizers, where it produces deleterious effects on aquatic flora and fauna by affecting various physiological, biochemical and cellular processes. Populations of fishes may indicate harmful changes caused due to pollution into the ecosystem. Changes in the population density may indicate negative impacts to the ecosystem.. Animal indicators also help in detecting the amount of toxins present in the tissues of animals (Joanna, 2006). Very little work has been done on the remedial measures of cadmium toxicity by using chelating agents. By reviewing the literature it has been observed that much attention has been paid by previous workers to evaluate toxicological effects of heavy metals on the physiological, histopathological and histochemical aspects species, but these studies are quite limited on aquatic system as fishes occupy the upper tropic level, there are greater chances of transferring cadmium to higher organisms particularly to man.By treating water bodies with vitamin, a measure problem of water can compensate. Vitamin E (α- tocopherol) is an effective chain breaking lipid soluble antioxidant in the biological membranes and protects cellular structures against damage from oxygen free radicals and reactive products of lipid peroxidation (Roch *et al.*,1996). It is an anticoagulant and reduces abnormal blood clotting and helps keep blood vessels free from blockages and it is important for the production of energy level and helps to control body temperatures. Vitamins exhibit versatile effects, while other agents can ameliorate only toxic effects of heavy metals and they are also beneficial in other ways too. Thus keeping in view the immense role of vitamin E, the present work has been undertaken to study the chelating effects of vitamin E along with toxicity of cadmium chloride in fishes.

MATERIAL AND METHOD

Cyprinus carpio the fresh water common carp without any discrimination of sex having a length of 16±18 cm and weighing 70 ±10 gms were obtained from the Central India Fish Farm, Bhopal.The fishes were acclimatized to the laboratory conditions for at least 14 days prior to the experiment in a glass aquariam (150 l) filled with dechlorinated tap water. The mean values for test water qualities were as follows: temperature 25±5°C, a ph of 7.4, total hardness 160 mg/l, alkalinity 86 mg/l (as $CaCO_3$) dissolved oxygen concentration of 8.0 ± 2mg/l aerated water. The physico chemical analysis of water was done according to the standard methods published by APHA (1985).Prior to experiment, toxicity tests were conducted to determine the LC_{50} and safe concentration values of cadmium chloride for 96 hours while sublethal concentration LC_{50} of cadmium chloride was determined by employing repeated exposure experiment using Probit analysis method of Finney (1971). Hemoglobin values were estimated as described by Godkar,(1999). A detailed investigation was carried out regarding the effects of cadmium chloride *per se* (1.7 mg/l), vitamin E *per se* (100 mg/kg, BW/diet) and along with vitamin E selected dose of vitamin E in different exposure periods ranging from 7, 15 and 30 days of short term exposure.

Table 1:

Parameter	Days of exposure	TREATMENT GROUPS			
		Control	Cadmium chloride (1.7mg/l)	Vitamin E (100mg/kg, BW/diet)	Vitamin E (100mg/kg, BW/diet) cadmium chloride (1.7mg/l)
P C V (%)	7 days	25.921[c] ± 1.041	18.221 [a,d] ± 0.470	25.825[a] ± 0.165	20.325[b] ± 0.134
	15 days	28.942[c] ± 0.241	16.135 [a,d] ± 0.354	28.836[a] ± 0.327	29.273[b] ± 0.463
	30 days	26.937[c] ± 0.435	14.134[a,d] ± 0.146	26.939[a] ± 0.546	26.225[b] ± 0.752
ESR (mm / hour)	7 days	2.012 ± 0.437	2.946 ± 1.035	2.08 ± 0.853	2.464 ± 0.027
	15 days	2.024 ± 0.627	2.817 ± 0.621	2.014 ± 0.538	2.392 ± 0.033
	30 days	2.242 ± 0.234	2.628 ± 0.219	2.231 ±0.133	2.376 ± 0.119
HAEMOGLOBIN (g/dl)	7 days	8.073[c] ± 0.046	7.131[a,d] ± 0.021	8.031[a] ± 0.041	7.881[b] ± 0.028
	15 days	8.012[c] ±0.031	6.959 [a,d] ± 0.048	8.018[a] ± 0.027	8.246 ± 1.032
	30 days	9.381[c] ± 0.017	6.615[a,d] ± 0.034	9.286 ± 0.427	8.176 ± 0.133

RESULT AND DISCUSSION

In the present study various haematological factors such as total red blood cells (T RBCs), total white blood cells (T WBCs), haemoglobin (Hb), packed cell volume (PCV) and erythrocyte sedimentation rate (ESR) were studied for the various periods of exposure from 7, 15, 30 days. Treatment of cadmium chloride significantly decreased the values of RBCs, Hb, PCV and WBCs. It has been found that cotreatment of vitamin E, detoxified the deleterious effects of cadmium, increasing the levels of Hb, and PCV. ESR values also increased during 7 days to 30 days of treatment whereas the cotreatment of vitamin E significantly reduced the toxic effect of cadmium chloride. These findings are in good agreement with those of El-Demerdash *et al.*, (2004) who observed that cadmium chloride significantly ($p<0.001$) decreased blood, Hb, packed cell volume,. Their results demonstrated the beneficial influence of vitamin E (100 mg/kg BW) alone or in combination in reducing the harmful effects of cadmium chloride. Similar findings have been observed in the present investigation. The present findings also revealed that, haemoglobin concentrations reflect the supply of an organism with oxygen and the organism itself tries to maintain them as much stable as possible. Haematological indices (Hb, PCV and ESR) can be secondary responses of an organism to irritants. Cadmium caused the damage of the erythrocyte membrane resulting in hemolysis and that vitamin E exerted a protective role against Cd induced destruction of RBC's. In the end we conclude that we can conserve biodiversity by protective measures of vitamins in order to get rid of heavy metals like cadmium chloride.

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