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ORIGINAL RESEARCH ARTICLE

The Impact of Cadmium on the Heamatological Parametrs in *Clarius batrachus* at Anaikarai Thanjavur District

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ABSTRACT

In the recent years man's activities on the environment have increasingly intensified due to population growth industrialization and advancements in new technologies. Natural environment is on integrated system and any change occurs in its components will affect the rest of components. Pollutants like pesticides, heavy metals, hydrocarbons and radio nuclides are discharged unto the surroundings due to mans activities, so they are called as anthropogenic substances will be toxic to the ecosystem if present in higher concentration.

Key words: Environment, population growth, Pollutants, Cadmium, *Clarius batrachus*

INTRODUCTION

Industrial process involving the use of water is invariably essential sources of metal pollution. Fossil fuel combustion, cement production, electric plating, thermal power station generates large volumes of liquid waste containing metal. Domestic sewage is also a source of metal pollution in the urban regions. Extensive uses of insecticides, pesticides will be discharged into the riverine system. Containing significant qualities of heavy metals. Cadmium emissions arise from two major source categories, natural sources and man-made or anthropogenic sources.

Even though the average cadmium concentration in the earth's crust is generally placed between 0.1 and 0.5 ppm, much higher levels may accumulate in sedimentary rocks, and marine phosphates and phosphorites have been reported to contain levels as high as 500 ppm. Weathering and erosion of parent rocks result in the transport by rivers of large quantities, recently estimated at 15,000 metric tones (mt) per annum, of cadmium to the world's oceans. Volcanic activity is also a major natural source of cadmium release to the atmosphere, and estimates on the amount have been placed as high as 820 mt per year. Forest fires have also been reported as a natural source of cadmium air emissions, with estimates from 1 to 70 mt emitted to the atmosphere each year. Other natural substances such as grass, plants and foods, all of which may contain cadmium.

Clarias batrachus is one of the air breathing fishes native Southeastern Asia but was brought into the U.S. in the 1960's for fish farming and it was out of one of these farms in Florida in the mid 60's that the first escape occurred and the first catch of this fish was by an angler on the 15th March 1967.Distribution in India, Bangladesh, Myanmar, Nepal and Pakistan. *Clarias batrachus* very rich sources of proteins and is reported to attain a maximum size of 34 cm to 60cm and weight of about 250 gms. It is surface and mid water feeder, mainly omnivorous with juveniles feeding on aquatic and terrestrial insects, detritus and phytoplankton. It has a characteristically large, upturned mouth with a prominent protruding law. Because of its high nutritive value. It is a highly priced food fish and a great demand in the market.

Cadmium is non-essential element with no known biological function, naturally found at low concentrations in natural waters [1, 2]. It is one of the twenty three heavy metal toxicants, cadmium released in considerable amounts through industries effluents into soil, surface and ground

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water system. The heavy metal are generally released in small amounts into the environment by process like weathering of rocks, volcanic eruption, etc., The cadmium is reported to be associated with the effluents of battery, electro plating metal finishing, mining, metallurgy, paints and dye industries .Cadmium as a back list toxic substance, its acute and sub-lethal effect of aquatic animals have been studied extensively in India and different countries. But from the available literature it is evident that the toxicity of cadmium on aquatic organisms in this species is very limited. Hence an attempt is made to study the toxicity of cadmium on the freshwater edible *Clarias batrachus.*

MATERIALS AND METHODS

The fresh water air breathing fish *Clarias batrachus* of 10 to 13cm length were collected from the river of Cauvery, Anaikarai (Thanjore district) in Kumbakonam southern districts of Tamil nadu, in India. They were acclimated to laboratory condition for a week prior to the experiment. All the fish were fed with commercially available fish feeds at daily intervals. The riverine fish *Clarias batrachus* were kept in 5 batches and each have 10 individuals.

In the experimental fish was collected from the Coleroon River (95 miles). Nearby Anaikarai (Thanjavur district). Anaikarai is a village panchayat under Thiruvidaimaruthur Taluk in Thanjore district, Tamil Nadu Anaikarai connected with two major bridge nearly 1 kilometer long on both side. It is island in the basin of Cauvary River. Nearly 2000 families live in Anaikari with the main occupation of agriculture and fishing it is well known and place for river fishes. Cauvary river commonly called collidam in Anaikari people. Collidam is also known as collidam and sometimes coleroon in English. This river flow through the delta of Thanjore later is get separated from the main branch of the Cauvary River at the island of Srirangam and thus flow eastworld near the Ayangudi, Muttam and finally flows into Bay of Bengal.

The experimental media was prepared with habitat water. Ten fishes were exposed in plastic tub containing 5 liters each 0.5%, 1.0%, 1.5%, 2.0% and 5.0% sublethal concentrations of cadmium for a period of 15days. Simultaneously a control was also maintained by using the habitat water as the medium. At the end of exposure period the control and experimental fish were starved for 24 hours for analyzing the biochemical assays. The blood samples were taken immediately by cardiac puncture method. The blood parameters are estimated by the standard methods.

RESULTS

The observation on the variations in the study of hematological, serological and hydrological parameters and t. test results are shown in (**Table 1 & 2**).

The concentration of blood hemoglobin (g/l) was well marked. It was maximum at 0.5% (5.88/l) during the end of experimental days. The normal value of blood hemoglobin 6.0 is also estimated. The differences of blood hemoglobin were observed. The observed value of blood hemoglobin observed by the help of haemoglobinometer. It was maximum at 0.5% (5.38g). During the experimental days the normal value of hemoglobin 6.0g is also marked. The low levels of Hb indicated anemic conditions in this due to stress-caused hemolysis [3] and inhibition of aerobic glycolysis curtailing denova synthesis of haemoglobin [4, 5, 6,].

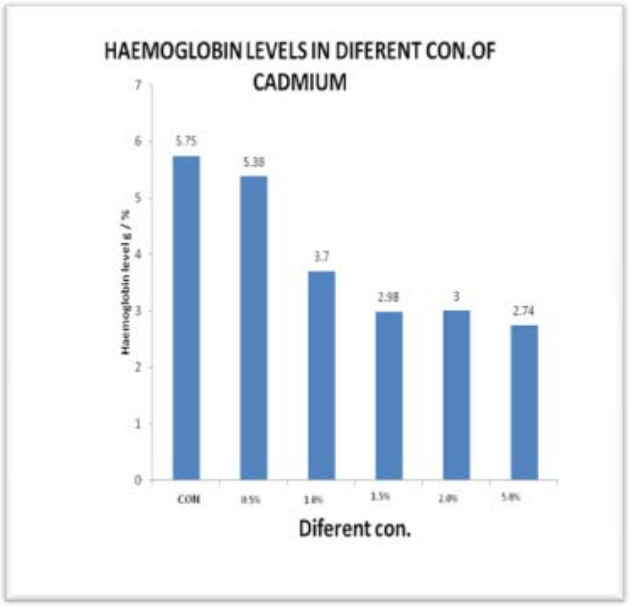
The value of total cholesterol (mg/dl) was well marked. It was maximum at 5.0% (198.3 mg/dl) during the end of experimental days. The normal value of total cholesterol 100.8 mg/dl, is also estimate. The differences of total cholesterol were observed. They observed value 0.5%, Cdcl 133.3mg/dl, 1.0% Cdcl experimental value of cholesterol 133.3 mg/dl and the 1.5% Cdcl experimental value 133.6mg/dl the 2.0% of Cdcl 166.6mg/dl was marked. The finally 5.0% Cdcl the 198.3mg/dl cholesterol value was marked. The same value observation recorded by Vinodhini.R and Narayanan, 2009. The concentration of blood glucose level (mmol/dl) was well marked. It was maximum at 5.0% (18.22 mmol/l) during the end of experimental days. The normal value of blood glucose 3.3 mmol/l is also estimated. The differences of blood glucose were observed. They observed value 0.5% Cdcl 3.9 mmol/l, 1.0% Cdcl 10.16 mmol/l 1.5%, Cdcl the observed glucose level 11.21 mmol/l the 2.0%Cdcl 13.3 mmol/l, finally the last 5% Cdcl 18.46 mmol/l . The same observation referred by Almeida [7] and Maheswaran [8].

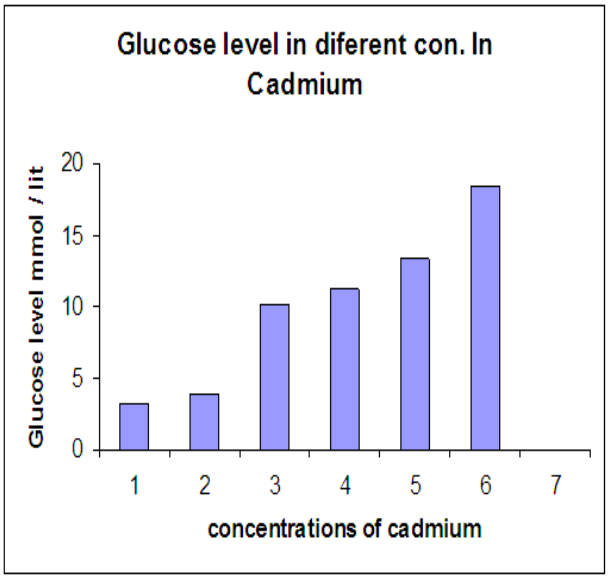
Table 1: Showing the student 't' test between the hematological parameters

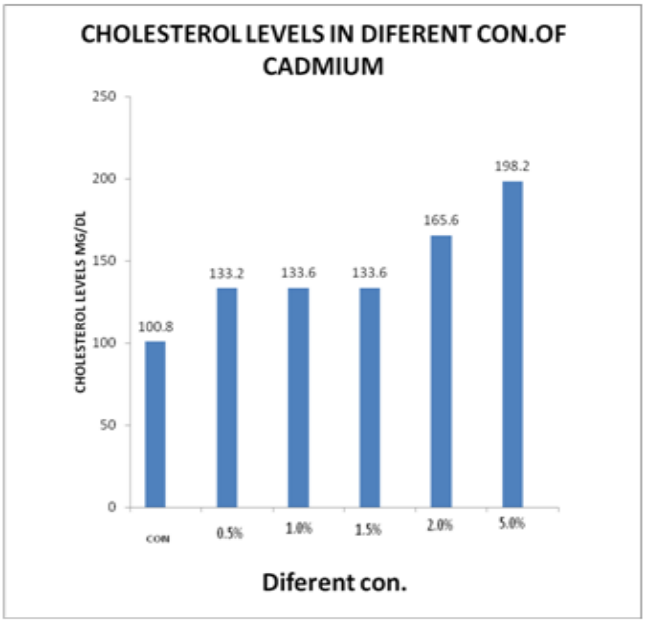
Parameters / Percentage	Control	Ex.1(0.5% Cdcl)	Ex.2 (1.0% Cdcl)	Ex.3 (1.5% Cdcl)	Ex.4 (2.0% Cdcl)	Ex.5 (5.0% Cdcl)
Hb(gm)	5.75±0.091	5.38±0.582	3.70±0.582	2.98±0.084	3.0±2.03	2.74±0.329
Cholesterol(mg/dl)	100.8±2.790	133.2±0.725	133.6±0.298	133.6±0.263	165.6±1.49	198.2±1.62
Glucose(mmol/l)	3.2±0.277	3.9±0.160	10.15±0.570	11.21±0.683	13.3±1.558	18.46±0.515

Table 2: Showing the student 't' test between the Hydrological parameters

Hydrological Parameter	Control	Ex.1 0.5% Cdcl	Ex.2 1.0% Cdcl	Ex.3 1.5% Cdcl	Ex.4 2.0% Cdcl	Ex.5 5.0% Cdcl
DO(ml/l)	2.824±0.04	2.826±0.03	2.827±0.02	2.827±0.021	2.25±0.18	2.25±0.051
Mg(mg)	2184±1.60	1000±2.26	1000±3.01	1200±3.20	1200±3.22	1200±3.57
TH(mg)	70±2.84	64±1.605	64±2.266	64±2.266	64±2.482	64±1.6024
CH(gm/kg)	0.113±0.0042	0.226±0.0046	0.226±0.0066	0.226±0.0060	0.226±0.0056	0226±0.0056
Cal(ppm)	0.600±3.204	1000±2.266	1000±3.040	1200±3.204	1200±2.26	1200±3.57
Salinity(ppt)	0.233±0.0042	0.437±0.0042	0.437±0.0052	0.437±0.0015	0.437±0.0021	0.437±0.0058
P^H	5.8±0.45	6.2±0.45	6.2±0.45	7.2±0.45	8.2±0.45	8.2±0.45
Alkalinity (mg)	0.336±0.0026	0.366±0.0016	0.335±0.0023	0.305±0..0032	0.305±0.0026	0.305±0.0036







DISCUSSION

The present study demonstrated the obvious toxic effect of cadmium on the biochemical parameters of air breathing fish *Clarias batrachus* (Kelaru). The hemoglobin decreased significantly in the blood of fish exposed to combined cadmium. It was evidenced that cadmium. Influences the differential blood counts. The results are in good agreement with earlier works that reported a significant decrease in hemoglobin volume of fresh water, fish exposed to cadmium [9, 10, 11]. Cholesterol is the most important sterol occurring in animal fats. It is equally distributed between plasma and red blood cells. The cholesterol occurs as white (or) faintly yellow almost odorless granules. Significantly increase in glucose during 15 days of cadmium in toxication. This might be due to the vulnerable

stress induced by the heavy metal cadmium resulted in hyperglycemia [12, 13].

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