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Short communication

EFFECT OF CADMIUM ON OXYGEN CONSUMPTION IN FRESH WATER GASTROPOD– BELLAMYA (VIVIPAROUS) BENGALENSIS (LAMARK).

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ABSTRACT: The rate of oxygen consumption was measured in cadmium chloride treated gastropod –Bellamya (viviparous) bengalensis for 7days, 14days and 21days and compared to the levels of controlled gastropod –Bellamya (viviparous) bengalensis. The study shows that the average oxygen consumption rate was decreased in treated group as compared group.

Key words: Cadmium, oxygen consumption, gastropod.

INTRODUCTION

Heavy metals are the most hazardous pollutents because of their non degradable nature and property to affect all kinds of ecological systems. The salts of the heavy metals are released from the commercial, industrial passes certain biological properties. The heavy metals enter into the body of animal including man through vegetarian and non vegetarian diet.(A.V.Andhale et.al.2012).Man made activities like mining, industrial discharge, sewage sludge disposal, fertilizers and pesticides applications have been the major culprits for elevated levels of mercury. Lead, cadmium and various other metals in the various ecosystems. (Chati R.S. et.al.2009). The oxygen consumption is generally taken as measure of intensity of metabolism. The rate of oxygen consumption is influenced by size. active stage in the life cycle of the animal and different environmental factors such as pH, oxygen content of water etc. The factors have pronounced effects on oxygen consumption of fresh water piokelotherms, since they have to live under the influence of natural fluctuations of the parameters. .(A.V.Andhale et.al.2012). Oxygen consumption is a measure of the metabolic state of animal. Hence considered as vital parameter and indicates the physiological and metabolic alteration in the animal. It is known that the respiratory roles alter under the influence of several biotic and abiotic factors(Prosser et.al 1973).Pollutants acts as physiological stress or for exposed organisms as do the environmental parameters(Newell 1973). The relationship between respiratory activity of animals and pollution has been revived by some workers (Robert et .al. 1972, Satyavely Ready et.al. 1982).

MATERIAL AND METHODS

The fresh water gastropod mollusc Bellamya (viviparous) bengalensis were collected from the suki dam near garbardi village Tal.Raver. Dist. Jalgaon (M.S.).Healthy, active and approximately equal sized gastropods were collected and used in the study. After collection the gastropods were acclimatized in the laboratory conditions at room temperature for 2 to 3 days in the dechlorinated tap water. Before starting the experiment healthy , active and acclimatized gastropods were divided in to two groups first group was maintained as controlled while group second was exposed to chronic dose of cadmium chloride (0. 24 ppm ,equivalent to the $Lc_{50/10}$) for 7days, 14 days, and 21 days. After 7days, 14 days, and 21 days exposure the gastropods were maintained in one liter air tight water container for one hour. The oxygen contents of the water before and after one hour were estimated by winkler's method. After the measurement of oxygen consumption the gastropods were dissected, flesh was taken out from their shells, blotted, dried on filter paper and wet body weight was determined. The oxygen consumption was calculated in ml/gm wet weight/hr/lit and is represented in table 1.

OBSERVATIONS AND RESULTS

In controlled group of gastropods the rate of oxygen consumption after 7days, 14 days, and 21 days was 0.1114±0.002, 0.1102±0.003, 0.1094±0.001 ml/gm wet weight/hr/lit. While in cadmium chloride exposed gastropods the rate of oxygen consumption was reduced to 0.1082±0.001, 0.1078±0.004, 0.1039±0.003 ml/gm wet weight/hr/lit. after 7days, 14 days, and 21 days exposure. The percent decreas in the rate of oxygen consumption was 2.87 after 7 days, 1.36 after 14 days and 5.29 after 21 days. The significant change in oxygen consumption was observed after exposure to cadmium chloride.

Table 1. Rate of oxygen consumption of gastropod Bellamya (viviparous) bengalensis after chronic exposure to cadmium chloride.

Group	Treatment	Average oxygen consumption ml/gm/hr/l ± S.D.		
		7 days	14 days	21 days
1	control	0.1114±0.002	0.1102±0.003	0.1094±0.001
2	Cadmium chloride 0.24 ppm	0.1082±0.001 (-2.87%)	0.1078±0.004 (-1.36%)	0.1039±0.003 (-5.29%)

The value in bracket indicates percent change over with respective days control.

DISCUSSION

Respiration in bivalves is considered to be an indicator of their metabolic index (Wlorekamp and Waterman 1960) and used to evaluate the effect of stress (Krishanarao 1982) or toxic substances in the environment (Thurberg et.al.1977). Decrease in oxygen consumption is observed when Balanus amphitrited and Balanus tinitinabulum is exposed to copper.(Prabhakar Rao et.al.1986).

Increased rate of respiration is noted in bivalve Lamilidians marginal's exposed to detergents (Chati R.S.et.al.2009).Alterations in metabolic changes on exposure of aquatic animals to toxic environment have been reported (Costa 1965, Chinnayya 1971). Induction of high rate of respiration under such conditions is one of them (Shambay 1979). Costa (1965) studied the effect of toxic substances like lead nitrate, copper sulphate, zinc sulphate and mercuric chloride on oxygen consumption. The toxic substances like copper sulphate, potassium ferrocynide, potassium oxalate, oxalic acid, zinc sulphate etc. decreases the rate of oxygen consumption (Wath E.M. et.al. 1992).

Toxicants alter the metabolic processes of organisms. The change in metabolic rate alters the biochemical pathways to resist the pollution stress (Thumberg F.P et.al.1974). Toxicant exposure causes respiratory disturbance and reduces oxygen consumption in crabs (Bhagyalakshmi A. 1981) and also in mollusc (Alam S.M. 1984, Jadhav S.M. 1993,Zanbre S.P. et.al. 1996). The rate of oxygen consumption was decresed due to the role of toxicants which acts as inhibitors. These inhibitors blocks energy derivation and affects oxygen uptake (Fukami J. 1976).

The formation of mucoid cords on gill lamellae hindered the diffusion of gasses and ultimately resulted in decreased respiration rate (Wong et.al. 1977).The rate of oxygen consumption in fresh water bivalve ,lammellidens marginalis was affected by nickel chloride (Andhale A.V. et. Al.2012).

The present study shows that on exposure to chroninic dose of cadmium chloride, the rate of oxygen consumption was considerably decreased with increased exposure period.

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