

Research Article

**ALTERATIONS IN LIPID CONTENTS OF FRESH WATER BIVALVE,
LAMELLIDENS MARGINALIS EXPOSED TO HEAVY METAL
SALT (LEAD NITRATE)**

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ABSTRACT

The present investigation was to evaluate the effect of heavy metal salts on the lipid contents in foot, digestive gland and whole body tissues of freshwater bivalves, *Lamellidens marginalis*. The *Lamellidens marginalis* were exposed to chronic doses (21 days) of heavy metal salts, lead nitrate (7.571ppm). The effects were studied and observed into two groups as control and experimental. The dry powders were used for lipid estimation. The results were reported in mg/100 mg dry weight of tissue. In present investigation, the lipid contents were found to be significantly decreased as compared to control. From the results it is also observed that, there was decrease in lipid contents with increase in period of exposure.

Keywords: *Lipid Content, Lead Nitrate, Lamellidens Marginalis*

INTRODUCTION

The fast development in industrialization and human exploitation of world mineral resources has resulted in high levels of heavy metals in the environment. The aquatic bodies near the industrial and urban area are more prone to the accumulation of such metals. There are number of toxic heavy metals, whose increasing levels in the environment are of serious concern today. 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).

Lead is a persistent metal, however, and is still present in the environment in water, brass plumbing fixtures, soil, dust, and imported products manufactured with lead.

Lead is a highly toxic substance. There are many ways in which humans are exposed to lead: through deteriorating paint, household dust, bare soil, air, drinking water, food, ceramics, home remedies, hair dyes and other cosmetics.

Lead is of microscopic size, invisible to the naked eye. Exposure to environmental stressors can induce oxidative stress in cells and result in a decrease in reducing potential and metabolic transformation to reactive intermediates (Simmons *et al.*, 2011).

Heavy metals are recognized as a strong biotoxins, because of their persistent nature and cumulative action to the aquatic flora and fauna (Sharma and Agrawal, 2005).

The heavy metals can cause biochemical alterations such as inhibition of enzymes, metabolic disorder, genetic damage, hypertension and cancer (Underwood, 1971; Lucky and Venugopal, 1977).

Lipids are responsible for variety of functions in molluscs. The lipids represent an energetic reserve because of their high caloric value and are mainly used in chronic stress conditions. In general, lipid generates more heat and energy than carbohydrates.

Phospholipids, also called structural lipids, are playing an important role in the cell membrane's formation (Martinez-Pita *et al.*, 2011).

Many workers studied the lipid alterations in various animals after exposure to toxicants (Zambare, 1991; Deshmukh, 1995; Deshmukh and Lomte, 1998; Waykar and Lomte, 2004; Shaikh, 2011). The present study investigates the effect of heavy metal salts, lead nitrate induced variation in lipid contents in the various tissues of the fresh water bivalve, *Lamellidens marginalis* after chronic exposure.

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MATERIALS AND METHODS

The bivalves, *Lamellidens marginalis* were collected from the Suki dam situated on Suki River near Garbardi nearly 31 kms away from Savda, Maharashtra, India. The bivalves were acclimatized to laboratory conditions for 2-3 days before to subjecting them to experiments. Only healthy and active bivalves were chosen for experiments. Two groups of healthy and active bivalves were formed. The bivalves group A were maintained as control. The bivalves from group B were kept as experimental group. The experimental group B was exposed to chronic concentration of (LC₅₀ value of 96 hr/10) heavy metal salt, lead nitrate (7.571 ppm) for 7, 14 and 21 days. The control group was treated without pollutant. The bivalves were dissected and their tissues like foot and digestive glands were excised and whole body mass of remaining animals was taken. All tissues were dried at 80^{0C} in an oven till constant weight was obtained. The dried powders of different tissues of control and experimental animals were used for estimation of lipids. Total lipids were estimated by using Vanillin reagent method as given by Barnes and Blackstok (1973).

RESULTS AND DISCUSSION

Table shows changes in lipid levels in different tissues of *Lamellidens marginalis* after chronic exposure to heavy metal salts, lead nitrate. The lipid contents of different body tissues like digestive gland, foot, and whole soft body tissues were found to be decreased with increase in the exposure period after chronic treatment of lead nitrate. In the present study different tissues were selected because different tissues and organs have different activities and metabolic rates and therefore their responses to the same toxicant may be different. The change in lipid contents in studied tissues was due to heavy metal stress indicates the change in activity of an organism. The biochemical changes occurring in the body gives first indication of stress. The decrease in lipid content in the fresh water snail's, after lead nitrate treatment may be due to reduced synthesis of lipid or increased activity of lipase involved in oxidation of lipids (Hollands, 1978).

The lipid alterations in various animals after exposure to toxicants were studied by (Caley and Jenson, 1973; Bhagyalakshmi, 1981; Patil 1986 and Chaudhary 1988).

Table : Lipid content in different tissues of fresh water bivalves, *Lamellidens marginalis* after chronic exposure to heavy metal salt, PbNO₃.

Treatment	Sr N o.	Body Tissue	The lipid content (%) $\pm$ S.D.		
			7 Days	14 Days	21 Days
(A) Control	I	W.B.	4.19 $\pm$ 0.18	3.98 $\pm$ 0.19	3.82 $\pm$ 0.23
	Ii	F	3.76 $\pm$ 0.21	3.74 $\pm$ 0.27	3.69 $\pm$ 0.28
	Iii	D.G	5.85 $\pm$ 0.25	5.76 $\pm$ 0.26	5.72 $\pm$ 0.23
(B) 7.571 PbNO ₃	I	W.B.	3.98 $\pm$ 0.26 (-5.97)	3.64 $\pm$ 0.21 (-8.54)	3.46 $\pm$ 0.24 (-9.42)
	Ii	F	3.43 $\pm$ 0.24 (-8.77)	2.96 $\pm$ 0.21 (-20.85)	2.73 $\pm$ 0.27 (-26.01)
	Iii	D.G	5.19 $\pm$ 0.40 (-11.28)	4.95 $\pm$ 0.42 (-15.06)	4.31 $\pm$ 0.46 (-24.15)

W.B.- Whole Body, F-Foot, D.G.-Digestive gland 1. Values are expressed as mg/100 mg of dry weight
 2. $\pm$ indicates S. D. of three observations.

Conclusion

It is concluded from this study that, overall decrease in lipid levels in different soft tissues of fresh water bivalve, *Lamellidens marginalis* was due to chronic treatment of heavy metal salt, lead nitrate. It has been also observed that severity of depletion in lipid content was more prominent as the exposure period increases

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