International Journal of Science and Research (IJSR)
ISSN: 2319-7064
SJIF (2022): 7.942

Exploring the Impact of Lead Nitrate on Glycogen Levels in *Barytelphusa Guerini*

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Abstract: ***The study investigates the fluctuation in glycogen content within selected tissues of Barytelphusa guerini following exposure to different periods of sublethal concentrations of lead nitrate. Results reveal a consistent reduction in glycogen levels in both the leg muscle and hepatopancreas throughout the exposure period, with the most significant depletion observed on the 30th day. The notable decrease in glycogen levels in the hepatopancreas suggests extensive utilization of stored glycogen, possibly to meet the increased energy demands associated with the crabs' heightened locomotor activity in response to lead nitrate toxicity. Interestingly, glycogen content initially increases before declining in the leg muscle and hepatopancreas following exposure to sublethal lead nitrate concentrations, indicating a nuanced response to the pollutant. The observed reduction in stored glycogen content in the liver and muscle of treated Barytelphusa guerini suggests an increased energy demand during periods of stress, met through glycogen utilization mediated by glycogenolysis. This indicates interference by lead nitrate with carbohydrate metabolism in Barytelphusa guerini, leading to decreased glycogen levels.***

Keywords: Lead nitrate, Glycogen, Metabolism, *Barytelphusa guerini*.

1. Introduction

Water bodies, whether from industrial, agricultural, or domestic sources, often become contaminated with heavy metals, posing significant risks to human health through the food chain (Saad et al., 1981; Ajmal et al., 1985). Heavy metals are particularly concerning due to their toxicity, persistence, and tendency to accumulate in organisms, leading to bio magnification within the food chain (Weis and Weis, 1977). Among these heavy metals, mercuric compounds are noted for their especially high toxicity (Agarwal, 1992). Numerous studies have documented the detrimental effects of mercury on various aspects of fish physiology, including physicochemical, enzymological, and reproductive parameters (Srivastava, 1982; Ram and Sathyanesan, 1986; Mohammed and Mohanna, 1994). Industrial activities are a significant source of mercury and its compounds into aquatic environments.

Crabs are integral components of aquatic ecosystems and often serve as important food sources for both humans and other organisms. Consequently, understanding the impact of heavy metal contamination, such as lead nitrate, on crab physiology is essential for evaluating the overall health of aquatic ecosystems and assessing potential risks to human consumers. Therefore, this study aims to elucidate the effect of lead nitrate on glycogen metabolism in the freshwater crab, Barytelphusa guerini. By examining the metabolic responses of these crabs to lead nitrate exposure, we can gain insights into the broader implications of heavy metal contamination on aquatic organisms and ecosystem health. the present study was undertaken to eluded the effect of lead nitrate on the glycogen metabolism of the fresh water crab, *Barytelphusa guerini*.

2. Material and Methods

The crab, *Barytelphusa guerini* were collected from the paddy field of Nanded District brought to the laboratory and maintained in plastic containers having sufficient amount of fresh water. The crabs were fed on dried prawns the plastic container was changed daily. The crabs were acclimated to the laboratory conditions for a week before used for the experiment. Healthy crabs were selected for present work to avoid effect sex and size (Ambore, 1976). After acclimation the crabs were treated to sub lethal concentration of lead nitrate for a period of 30 days. After 10, 20 and 30 days the control and the experimental crabs were dissected and the glycogen and glucose content were estimated by adopting the method of Kemp *et. al.*, (1954) respectively.

3. Results and Discussion

Lead nitrate exposed tissues of *Barytelphusa guerini* shows glycogen.

Parameter	Tissues	Treatment	Days of exposure		
			10	20	30
Glycogen	Leg muscle	Control	2.16 ± 0.02	2.20 ± 0.04	2.30 ± 0.05
		Sublethal	1.70 ± 0.32	1.65 ± 0.15	1.69 ± 0.16
	Hepatopancreas	Control	22.18 ± 0.52	22.0 ± 0.60	21.80 ± 0.4
		Sublethal	16.18 ± 0.13	16.80 ± 0.18	14.20 ± 0.12

Values expressed as mg/g wet. wt for tissue; mean ± indicates the mean of 6 individuals observation.

The table illustrates the fluctuation in glycogen contents within selected tissues of Barytelphusa guerini following exposure to different periods of sublethal concentrations of lead nitrate. The exposure of crabs to lead nitrate resulted in a reduction in glycogen levels in both the leg muscle and

hepatopancreas throughout the duration of exposure, with the maximum depletion observed at the 30th day.

The marked decrease in glycogen levels in the hepatopancreas indicates an extensive utilization of stored glycogen, potentially to meet the increased energy demands associated with the quick and brisk movements exhibited by the crabs in response to lead nitrate toxicity. Interestingly, the glycogen content initially increased and then decreased in the leg muscle and hepatopancreas following exposure to sublethal concentrations of lead nitrate, indicating a complex response to the pollutant.

Observations from previous studies on other crustacean species exposed to different pollutants further support the observed depletion in glycogen content. For instance, Bhagyalakshmi (1981) noted a reduction in haemolymph glucose levels in freshwater crabs following exposure to sumithion, while A. N. Khan et al. (1988) observed decreased glycogen content in crab species after exposure to naphthalene. Additionally, Nagabhushanam and Kulkarni (1981) and Reddy et al. (1989) reported similar reductions in glycogen content in various crustacean species subjected to heavy metal pollution stress.

The observed reduction in stored glycogen content in the liver and muscle of treated Barytelphusa guerini suggests that during periods of stress, there is an increased demand for energy, which is met through glycogen utilization mediated by glycogenolysis. These findings indicate that lead nitrate interferes with carbohydrate metabolism in Barytelphusa guerini, leading to a decrease in glycogen levels.

In conclusion, the results of the present investigation provide valuable insights into the metabolic responses of Barytelphusa guerini to heavy metal contamination, particularly lead nitrate. The observed alterations in glycogen levels highlight the potential impacts of environmental pollutants on carbohydrate metabolism in aquatic organisms, underscoring the need for effective pollution mitigation strategies to protect aquatic ecosystems and their inhabitants.

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