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Influence of selenium on lethal lead induced phosphoglucomutase variations in brain regions in three fresh water teleost

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Abstract
In the present investigation the author made an attempt to investigate the lethal effect of Lead in presence of selenium as protective agent on differential distribution of phosphoglucomutase in various brain regions (cerebrum, diencephalon, cerebellum and medulla oblongata).

Keywords: lethal, lead, selenium, phophoglucomutase and brain regions

Introduction
Many toxins get stored in fat (kivi. 2010) fish are the top of the aquatic food chain are exposed to higher levels of toxins directly from polluted water and by feeding on other fishes who are already exposed to high levels of toxins in water (kivi 2010 and Sharma 2008) Fish is one of the main food and international economic sources in many region. Additionally, it contains an essential nutritional diet such as vitamin D, vitamin B12, vitamin A and vitamin E (Zalloua, P. 2007) As a procedure during leather manufacturing in the industries, large qauntity of wastes produced are discharged in natural water bodies directly or indirectly through open drains without any treatment or with inappropriate and inadequate treatment processes causing pollution and leading to serious public health hadard (Ganguly 2011) [13].
Lead is one of the most dangerous and potential toxic metal in ecosystem. The toxicity level may affect growth and enzyme activity and even respiration of organism. The storage of metal by detoxifying mechanism makes them available for assimilation by the biota and bio magnification along the aquatic food chains (Muhaemin 2005 and Raibole 2013).

Material and Methods
Determination of safety and lethal concentration
Safety and lethal concentrations of lead were determined on *Labeo rohita*, *Clarias batrachus* and *Channa punctatus* by the Probit Analysis Method (Finney, 1971). Higher concentration of lead were used and slowly reduced the amount of concentration to know the Lc 50/100 value for 96 hour exposure.

Enzyme assay
The Phosphoglucomutase were assayed by the technique of Methods in Enzymology Kaplan & Colowick (1970), Crane & Sole (1953), Weiser & Quill (1972), Tsai & Kemp (1974), Racker (1946). Elliott (1955) Gracy & Tilley (1973), Plummer (1988) and Shaffi and Habibullah (1977).

Result and Discussion
The lethal lead concentrations induced marked phosphoglucomutase variations in various brain regions and the optimum phosphoglucomutase fall was recorded in diencephalon at 08 hrs in comparison to cerebrum at 16 hrs, medulla oblongata at 24 hrs and in cerebellum at 24 hrs in *L.rohita*, than in *C.batrachus*(diencephalon at 08 hrs, cerebrum at 16 hrs, medulla oblongata at 24 hrs and in cerebellum at 24 hrs) and in *C.punctatus* (diencephalon at 08 hrs, cerebrum at 24 hrs, medulla oblongata at 24 hrs and cerebellum at 16 hrs).
The lethal lead impact was studied in presence of selenium and the fall in phosphoglucomutase was maximum in diencephalon at 08 hrs accompanied by cerebrum at 16 hrs, medulla oblongata at 24 hrs and cerebellum at 24 hrs in *L.rohita*, than in *C.batrachus* (diencephalon at 08 hrs, cerebrum at 24 hrs, medulla oblongata at 24 hrs and cerebellum at 24 hrs) and in *C.punctatus* (diencephalon at 08 hrs, cerebrum at 16 hrs, medulla oblongata at 24 hrs and cerebellum at 08 hrs) (Tab and Graph). The lethal lead concentrations caused substantial phosphoglucomutase variations in various brain regions and the optimum fall in phosphoglucomutase fall was noticed in cerebrum at 08 hrs, followed by diencephalon at 08 hrs, medulla oblongata at 08 hrs and cerebellum at 24 hrs in *L.rohita*, than in *C.batrachus* (diencephalon at 08 hrs, cerebrum at 16 hrs, medulla oblongata at 16 hrs and cerebellum at 24 hrs) and in *C.punctatus* (diencephalon at 08 hrs, cerebrum at 24 hrs, medulla oblongata at 24 hrs and cerebellum at 08 hrs).

Table 1: Influence of selenium on lethal lead induced Phosphoglucomutase variations in various brain regions in three freshwater teleosts-acute studies

Name of Species	Regions of the brain	Lethal (Lead) exposure					Lethal (Lead) exposure with selenium				
		Control	8hrs	16hrs	24hrs	% of F/R	Control	8hrs	16hrs	24hrs	% of F/R
Labeo rohita (Ham.)	Cerebrum	0.464 ±0.076	0.384 ±0.048	$0.198^{c,d}$ ±0.024	$0.116^{b,c,e}$ ±0.024	75	0.464 ±0.067	0.352^{e} ±0.036	$0.182^{b,c}$ ±0.028	$0.143^{a,b}$ ±0.038	69
	Diencephalon	0.329 ±0.038	0.124^{b} ±0.026	0.099^{b} ±0.016	0.062^{a} ±0.010	81	0.329 ±0.037	0.184^{b} ±0.024	0.146^{b} ±0.020	$0.095^{a,c}$ ±0.014	71
	Cerebellum	0.218 ±0.026	0.196 ±0.038	0.164 ±0.022	$0.098^{c,d}$ ±0.016	55	0.218 ±0.026	0.184 ±0.016	0.162^{e} ±0.019	0.104^{e} ±0.024	52
	Medulla oblongata	0.366 ±0.032	0.298^{e} ±0.042	0.249^{d} ±0.032	$0.124^{b,c,d}$ ±0.019	66	0.366 ±0.044	0.309 ±0.032	0.279^{e} ±0.024	$0.139^{b,c,d}$ ±0.030	62
Clarias batrachus (Linn.)	Cerebrum	0.394 ±0.039	0.344 ±0.026	$0.166^{b,c}$ ±0.014	$0.130^{a,b}$ ±0.014	67	0.394 ±0.052	0.333 ±0.042	0.286^{e} ±0.033	$0.141^{b,c,d}$ ±0.026	64
	Diencephalon	0.284 ±0.042	0.149^{d} ±0.018	0.115^{c} ±0.021	$0.076^{b,e}$ ±0.013	73	0.284 ±0.038	0.184^{e} ±0.019	0.148^{e} ±0.023	$0.096^{b,e}$ ±0.014	66
	Cerebellum	0.194 ±0.028	0.169 ±0.012	0.142 ±0.032	0.093^{e} ±0.012	52	0.194 ±0.028	0.179 ±0.022	0.154 ±0.018	0.100^{e} ±0.012	48
	Medulla oblongata	0.309 ±0.019	0.282 ±0.036	0.238^{e} ±0.042	$0.132^{b,c,e}$ ±0.010	57	0.309 ±0.039	0.266 ±0.032	0.212^{e} ±0.017	$0.154^{d,e}$ ±0.028	50
Channa punctatus (Bloch)	Cerebrum	0.326 ±0.036	0.284 ±0.026	0.230^{e} ±0.028	$0.120^{b,c,e}$ ±0.012	63	0.326 ±0.032	0.284 ±0.024	0.192^{e} ±0.016	$0.136^{d,e}$ ±0.014	58
	Diencephalon	0.234 ±0.039	0.148^{d} ±0.016	0.106^{b} ±0.018	$0.074^{a,e}$ ±0.009	68	0.234 ±0.024	0.171 ±0.019	0.141^{e} ±0.021	$0.086^{c,d}$ ±0.014	63
	Cerebellum	0.168 ±0.028	0.149 ±0.021	0.114 ±0.019	0.089^{d} ±0.012	47	0.168 ±0.018	0.134 ±0.017	0.118^{e} ±0.016	0.095^{d} ±0.015	43
	Medulla oblongata	0.266 ±0.036	0.210 ±0.036	0.184^{e} ±0.021	$0.119^{c,d,e}$ ±0.017	55	0.266 ±0.029	0.232 ±0.026	0.191^{e} ±0.019	0.140^{d} ±0.021	47

Values are mean ± SDM of 7 Replicates. The data was subjected to test of ANOVA and Superscripts a-e indicates that p> 0.01, 0.02, 0.03, 0.04 & 0.05.
*F-Fall /R-Rise

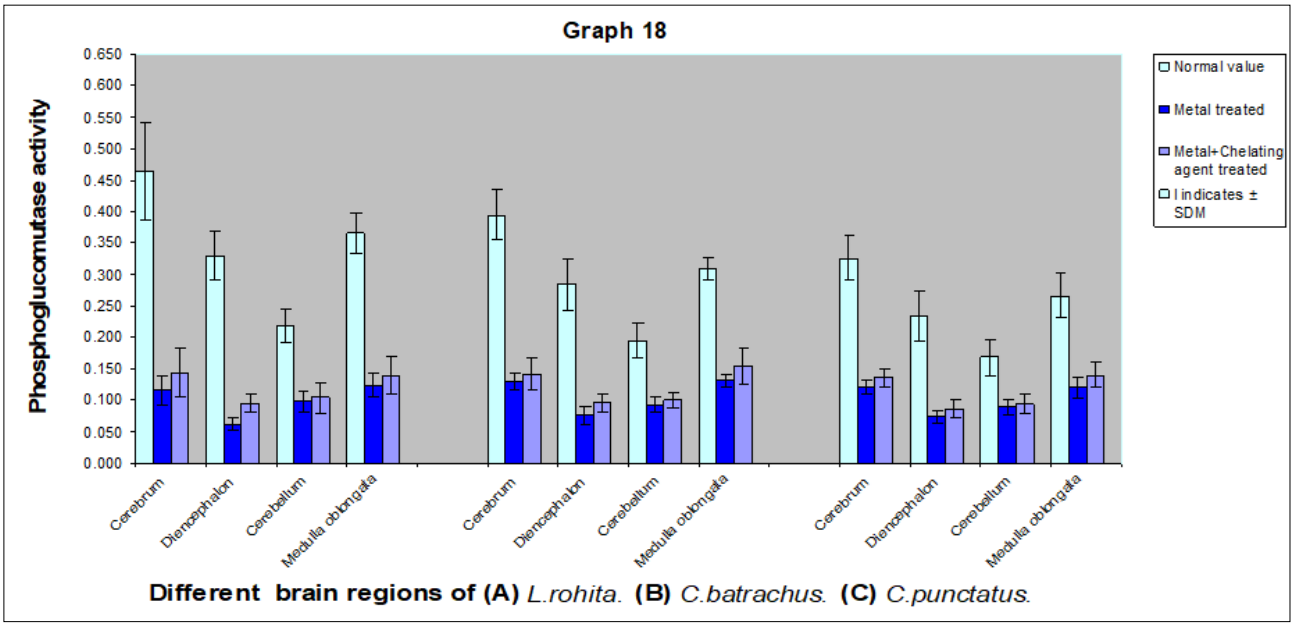

Fig 1

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