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Effect Of Lead Acetate In Adult Albino Rats

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Abstract: ***An investigation was conducted to study the lead acetate (in saline) at two levels viz. 15mg/day/rat (group A) and 30 mg/day/rat (group B) in albino rats for 90 days. The study revealed highest lead content of 6.84 ppm in the spleen of rats fed with 30 mg of lead acetate daily. The albino rats fed with lead acetate at the level of 30 mg per animal/day also showed nervous symptoms like hemiplegia and edema in muscle, hyperaemia in liver and necrosis of convoluted tubules in the kidneys. Whereas the groups A rats fed on 15 mg of lead acetate did not have lead in detectable level in other muscle and organs. It is noticed that lead acetate in using large doses could produce symptoms of lead toxicity though not very characteristics and brought about changes in the concentration of other toxic metals in body tissues.***

Keywords: Lead acetate, Albino rats, Atomic Absorption Spectrophotometer (AAS).

I. INTRODUCTION

Lead is one of the ubiquitous pollutants. In the developing countries of the world introduction of lead has been associated primarily with growth of industry and the expanding use of motor vehicle in transport. Lead is a potent nephrotoxic agent causing extensive damage to tubular cells and causes reduced growth, impaired reproductive functions, spleenomegaly, damage to the haemopoitic, central and peripheral nervous systems. This study was undertake to observe the toxic effects of lead acetate in albino rats.

II. MATERIALSAND METHODS

Thirty adult female albino rats, weighing 80 to 100g were received from the Departmental Laboratory. They were acclimatized in the laboratory for one week. The albino rats were randomly divided into control and treatment groups 'A' and 'B'. The control group comprised of six rats, while the other two groups had twelve each. Rats in group 'A' received daily 15mg each of lead acetate dissolved in normal saline and rats in group 'B' received 30 mg each of lead acetate in saline. The test was conducted for a period of 90 days. Necropsies were performed on the albino rats, which died during the process and on those sacrificed at the end of the experiment (90th day).

The samples were analyzed every week using Atomic Absorption Spectrophotometer (AAS). The data were analyzed statistically following the standard method suggested by Snedecor and Cochran (1967).

III. RESULTS AND DISCUSSION

The mean S.E. content of Cadmium, Chromium, Copper, Lead and Zinc in muscle and organs like liver, kidney, heart and spleen of Albino rats is furnished in Table - 1.

TOXIC METALS	ORGANS	CONTROL	TREATMENT GROUPS	
			A	B
CADMIUM	Heart	1.50 ± 0.03	1.44 ± 0.02	1.61 ± 0.04
	Kidney	0.90 ± 0.10	1.28 ± 0.07	1.39 ± 0.03
	Liver	0.97 ± 0.07	1.09 ± 0.06	1.24 ± 0.04
	Muscle	1.36 ± 0.06	1.14 ± 0.04	1.25 ± 0.03
	Spleen	1.50 ± 0.03	1.89 ± 0.03	1.96 ± 0.02
CHROMIUM	Heart	2.14 ± 0.03	8.10 ± 0.12	6.66 ± 0.16
	Kidney	2.01 ± 0.07	2.17 ± 0.07	3.13 ± 0.05
	Liver	2.43 ± 0.05	2.06 ± 0.13	2.35 ± 0.10
	Muscle	1.87 ± 0.02	1.79 ± 0.05	1.54 ± 0.16
	Spleen	2.48 ± 0.02	0.37 ± 0.02	2.08 ± 0.06
COPPER	Heart	15.83 ± 0.26	8.35 ± 0.20	1.67 ± 0.03
	Kidney	4.17 ± 0.04	11.48 ± 0.26	1.38 ± 0.04
	Liver	4.18 ± 0.07	9.23 ± 0.36	1.44 ± 0.15
	Muscle	4.54 ± 0.05	2.60 ± 0.17	1.38 ± 0.01
	Spleen	24.96 ± 0.38	10.99 ± 0.27	1.93 ± 0.05
LEAD	Heart	BDL	BDL	2.27 ± 0.07
	Kidney	BDL	BDL	3.84 ± 0.02
	Liver	BDL	BDL	1.85 ± 0.04

	Muscle	BDL	BDL	0.81 ± 0.62
	Spleen	BDL	BDL	6.84 ± 0.11
ZINC	Heart	20.45 ± 0.32	78.42 ± 0.31	40.24 ± 0.25
	Kidney	31.38 ± 0.37	37.36 ± 1.70	39.45 ± 0.23
	Liver	52.71 ± 0.53	66.52 ± 0.41	69.79 ± 0.32
	Muscle	16.87 ± 0.34	40.14 ± 0.35	38.02 ± 0.69
	Spleen	20.02 ± 0.43	34.39 ± 0.29	46.61 ± 0.98

BDL – Below Detectable Level; Group A – 15 mg/day/rat; Group B – 30 mg/day/rat

Table 1: Mean toxic level of toxic metals (ppm) in muscle, liver, kidney, heart and spleen of Albino rats

CADMIUM

In the experimental study with albino rats, the control group had the highest cadmium content in heart and spleen (1.50 ± 0.03 ppm). In the treated group 'A' rats fed with lead acetate at 15mg/rat/day, the highest cadmium content was found in spleen (1.89 ± 0.03 ppm). In treated group 'B' rats fed with lead acetate at 30 mg/rat/day, the highest cadmium content was found once again in spleen (1.96 ± 0.02 ppm).

The statistical analyses revealed highly significant ($P<0.01$) difference in cadmium level between control and treated groups in their organs. Though the rats showed higher cadmium content than the permissible level of 0.1 ppm (Bartik and Piskac, (1981,) the rats did not show any symptoms for cadmium toxicity as reported by Powell *et. al*, (1964).

CHROMIUM

In the control group chromium content was found in highest concentration (2.48 ± 0.02 ppm) inspleen. Where as in the treated group, more chromium was deposited in the heart muscle. The statistical analyses revealed highly significant ($P<0.01$) difference in chromium levels between the control, group 'A' and 'B' and also between their organs indicating that feeding of lead alters the storage site of chromium in the body. However, there were no typical pathological changes in the muscle and their organs of rats to confirm chromium poisoning.

COPPER

The highest copper content was found in spleen (24.96 ± 0.38 ppm) of control group, (11.48 ± 0.26 ppm) in kidneys of group 'A' and 1.93 ± 0.05 ppm) in spleen of group 'B' of albino rats. This had indicated that there was some inter relationship between the two metals as the level of lead in the diet was in the increase; there was proportionate drop in copper concentration in the tissues of rat. The examination of muscle and organs of the albino rats did not reveal any changes for copper toxicity as reported by Gracey and Collins (1991).

LEAD

The control and treatment group 'A' did not have lead in detectable level in muscles and organs in spite of group 'A' receiving lead in the diet. The group 'B' rats showed highest lead content in spleen (6.84 ± 0.11 ppm). Two albino rats of group 'B' that died during the experiment showed nervous symptoms like hemiplegia (Fig.1). The histological section revealed oedema of muscle, hyperaemia in liver and necrosis of proximal convoluted tubules in the kidneys and muscles was observed by Hamir and Sullivan, (1983). Hemorrhages in spleen was noticed in lead poisoned dogs by Harrison and Staples (1955); Dodd and Staples (1956); Wilson and Lewis (1963); were also observed in the present study.

ZINC

The highest zinc content was found in (52.7 ± 0.53 ppm). The liver of control group in the heart tissue of group 'A' (78.42 ± 0.31 ppm) and in the liver of group 'B' albino rats (69.79 ± 0.32 ppm). Examination of muscle and organs of albino rats die not reveal any lesion characteristic of zinc toxicity as reported by Luckey and Venugopal (1977). The experiments conducted with albino rats revealed that feeding of lead brought about changes in the concentration of other toxic metals in the body tissues. Sometimes even altered the storage site of these metals. Lead only in very large dose could produce symptoms of lead toxicity in rats though not characteristic.

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