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The impact of cobalt chloride on enzyme activity of mice

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Abstract

Objective: Liver is a primary site of toxic and plays important role metabolism, any changes in cobalt concentration in blood; this may affect the activities of antioxidant enzymes for adult male mice. (80) Days old, weighing 30- 35 gm., were treated orally COCl2 (15, 30, 45) mg / kg Body weight for 30 days. The acid phosphatase, alkaline phosphatase in the plasma and liver were estimated. There was a significant increasing in the activity of enzyme ($p<0.05$), these enzyme with moderate and high dose (30, 45) while no change with low dose (15). This investigation concluded that $COCl_2$ caused increasing in the levels of enzyme with increase of dose.

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Introduction

Trace elements occur naturally in the ground and surface. Cobalt is one of trace elements in the body and participates in the biological and functions of several protein and enzymes (Maity *et al.,* 2008). Cobalt is metabolic element used in animal nutrition; liver and kidney are the most tissues containing the highest cobalt concentrations as a response to increased cobalt concentration feed (Aquilian *et al.,* 2012).

Exposure to cobalt inhibits the activity of DNA polymerase (.Korma *et al.,* 1978). Necrosis of thymus was reported to cobalt sulfate and hyperplasia of mediastina lymph nodes of mice (Bucher *et al.,* 1990). Cobalt exposure to human has been reported to cause effect on nervous system (Jordan *et al.,* 1990). Cobalt, cadmium is known suspected carcinogens (Mayes 1997).

The effect of $COCl_2$ have been evaluated and their sub chronic administration were followed in doses of activities of some plasma and liver enzyme.

Materials and methods

Adult male mice weighing 30-35 gm., 70 days old, the experimental animals were divided into three groups (A, B, C). The animals were daily administered COCL2 doses of (15, 30 and 45) mg / Kg of body weight for 28 days.

The acid phosphatase and alkaline phosphatase in liver homogenized and plasma were estimated by standard procedures (Kind and King 1954; King and Jagthessan 1959). The values were analyzed using t – test.

Results

Results were represented in three tables, table 1 represent the effect of cobalt chloride on the liver by which the effect is diverse according to the weight of the liver, while table 2 data was collected in vivo effect of acid phosphate on liver using cobalt chloride and table three shows the effect of alkaline phosphate activity in plasma and liver of mice.

Table 1. The effect of $COCl_2$ on the liver weight in gram.

Sample	Liver weight gm.
Control	1.6 ± 0.21
15 mg/kg $COCl_2$	1.59 ± 0.11
30 mg/kg $COCl_2$	1.4 ± 0.22
45 mg/kg $COCl_2$	1.3 ± 0.23

Discussion

In the present work the result of different treated groups have been compared with control, the intake feed and water by treated mice reduced as compared with control. The liver weight show significant decrease with increase of doses Table (1).

Table 2. In vivo, the effect of $COCl_2$ on acid phosphatase activity in plasma and liver, ($p<0.05$).

Sample	Plasma µ mole phenol produced / min / 100 ml	Liver µ mole phenol produced / min /gm `
Control	4.12 ±0.82	130 ± 3.81
15 mg/kg $COCl_2$	4.01± 0.71	129 ± 4.12
30 mg/kg $COCl_2$	3.81± 0.91	120 ± 5.11
45 mg/kg $COCl_2$	3.52 ± 0.89	115 ± 4.92

The activity of acid phosphatase in plasma and liver of mice were significantly increased of doses, table 2. While the activities of alkaline phosphatase as show in Table 3. The results demonstrate that the activity of enzyme in mice treated with COCL2 and caused increased in the activities of this enzyme that result consistent with Gathwan (Gathwan *et al.,* 2012). Liver important in metabolism and maintain energy level and structural stability of body (Gathwan *et al.,* 2013). The toxic effects of cobalt chloride are to conjugate with natural complement of enzyme in the body, and caused significant elevation in plasma and

liver. The phosphate enzyme act by hydrolyzing phosphatase, these may be involved in transfer of phosphate (Guyton and Hall 2006). The increased of enzyme activities may be indicate to metabolic activity, these enzyme change indicative of the cellular toxicity and tissue damage in mice probably by altering the specific molecular pathway.

Table 3. In vivo effect of $COCl_2$ on alkaline phosphatase activity in plasma and liver, ($p<0.05$).

Sample	Plasma µ mole phenol produced / min/ 100 ml `	Liver µ mole phenol produced/ min / gm`
Control	201 ± 3.8	36.2 ± 2.14
15 mg/kg COCL2	198 ± 5.4	35.9 ± 1.93
30 mg/kg COCL2	185 ± 4.9	31.7 ± 2.22
45 mg/kg COCL2	175 ± 6.2	28.4 ± 1.81

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