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Research Article

BIOCHEMICAL EFFECTS OF ENDOSULFAN IN LIVER OF ALBINO RATS

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ABSTRACT

Sub lethal dose (0.34ppm/kg-1) of endosulfan was injected to 6 week of male albino rats for 15, 30, and 45 days of exposure. Control and treated rats were fed with standard prescribe diet and water *ad libitum*. Aspartate Amino Transferas (AST) Alanine Amino Transferase (ALT) enzymes and Cholesterol level were estimated. A significant change was observed in enzyme and Cholesterol level in liver of albino rats. Activity of ALT, AST and Cholesterol were increased. ALT, AST enzymes are involved in amino acids metabolism and an increase in these enzymes indicate tissue damage or toxic effects in liver another possibility may be due to cellular damage or increased permeability of plasma membrane and leakage of lysosomal enzymes causing enhanced released of enzymes. Increase in Cholesterol level may be due to rapid synthesis and accumulation of Cholesterol in liver of rats. The result of the present findings suggests that endosulfan has adverse effect on liver functioning leading to biochemical disorders.

Keyword: Endosulfan, ALT, AST, Sub lethal, Accumulation.

INTRODUCTION

Large scale manufacture and tremendous utilization of a variety of pesticides and their formulation for the control of crop pests and vectors of communicable diseases has caused global concern[1]. Endosulfan a nonsystemic contact organochlorine insecticide and acaricide is used extensively for pest control. There is some indication that endosulfan can have adverse effect on the immune system at low level of exposure[2]. In India about 1000 metric tons of endosulfan and its formulations have been in use[3]. Reports are available on the physical and chemical as well as toxicological effects of endosulfan in animals[4]. In view of its large scale use there is urgent need to gather more toxicological data on the cumulative effects of endosulfan in mammals which could be utilized for the meaningful extrapolation of poisoning in the humans. This has therefore, prompted us to investigate the cumulative effects of endosulfan using some parameters such as clinical signs of toxicity.

MATERIAL AND METHODS

CHEMICAL : The liquid endosulfan (Thioden 35% EC) used in this study was obtained from Northern Minerals Limited agrochemical shop in watt market, Ahmedabad, (Guj.) Technically endosulfan is a mixture of two isomers-alpha-endosulfan and beta-endosulfan in the ratio 7:3.

ANIMAL:Healthy albino rats of 6 week of age were collected and reared in the Department of Zoology, Ajmer. A total number of 30 albino rats were maintained in 20cm×30cm×25cm steel cages in the laboratory and fed with the standard laboratory chew food and water *ad* libitum under constant conditions at room temperature before and throughout the experimental work. Rats were divided into two different groups as a control and experimental. Experimental animals were given sub lethal dose (0.34ppm/kg-1) of endosulfan through intradermal injection. Biochemical parameters such as AST and ALT were determined by IFCC Method [5]. Cholesterol level was determined by Roeschlau Method[6] used in diagnostic laboratory tests.

Observation

Freshly removed liver was washed free from extraneous material using chilled saline and homogenized in homogenizer. The homogenate was centrifuged at 700×g for 10 min to remove cell debris. The supernatant of liver was used for enzyme and cholesterol estimation.

Table 1: Biochemical changes in 6 week of albino rats after injected acute LD_{50} dose of endosulfan

Observations	Days	Control	Experimental (0.34ppm/kg^{-1} bw)
Cholesterol (µg/mg wet weight of tissue)	15	7.37±0.41	8.12±0.39
	30	10.04±0.80	11.26±0.77
	45	12.86±0.50	13.45±0.30
AST (µmole/min/g tissue weight)	15	12.03±0.24	13.16±0.29
	30	14.08±0.13	15.02±0.36
	45	16.05±0.08	17.77±0.26
ALT (µmole/min/g tissue weight)	15	10.26±0.36	11.38±0.34
	30	12.76±0.10	13.32±0.32
	45	14.42±0.05	15.12±0.03

Value represents the mean± SE of 5 animals

RESULTS

The changes in biochemical parameters in liver of experimental and controlled group are shown in Table 1 and Fig.1. Treatment with acute dose (0.34ppm/kg^{-1}) of endosulfan for 15, 30 and 45 days of exposure in liver showed increase in cholesterol level and enzyme such as AST and ALT.

DISCUSSION

The present Study suggested that exposure of endosulfan caused increase in the level of cholesterol in the liver of male albino rats. Cholesterol levels were considered as valuable indicator of drug-induced disruption of lipid metabolism. Increase of cholesterol level in rats suggests increased synthesis and accumulation of Cholesterol or impaired biliary function[7]. Similar results were also reported in rats treated with dimethoate[8]. hepatocellular necrosis leads to high level of serum marker in blood. Among these AST and ALT represent 90% of total enzymes in the blood is better index of liver injury[9]. The increase in cholesterol level indicates inhibitory action of pesticide on Cyt-p-450 enzyme[10]. This might be due to high affinity bindings[11]. In the present study cholesterol increase in the liver might be due to inhibition in the activity of enzymes involved in cholesterol break up

results into deposition of cholesterol in the cell. In the present Study endosulfan caused increase in the activity of AST and ALT in the liver of male albino rats these result might be due to cellular damage or increased permeability of plasma membrane. The ALT, AST enzymes are involved in amino acids metabolism and an increase in these enzymes indicate tissue damage or toxic effects in liver[12]. In the present Study the rise in AST and ALT levels in the liver of male rats could be due to hepatotoxicity causing permeability alterations and leakage of lysosomal enzymes causing enhanced released of enzymes[13].

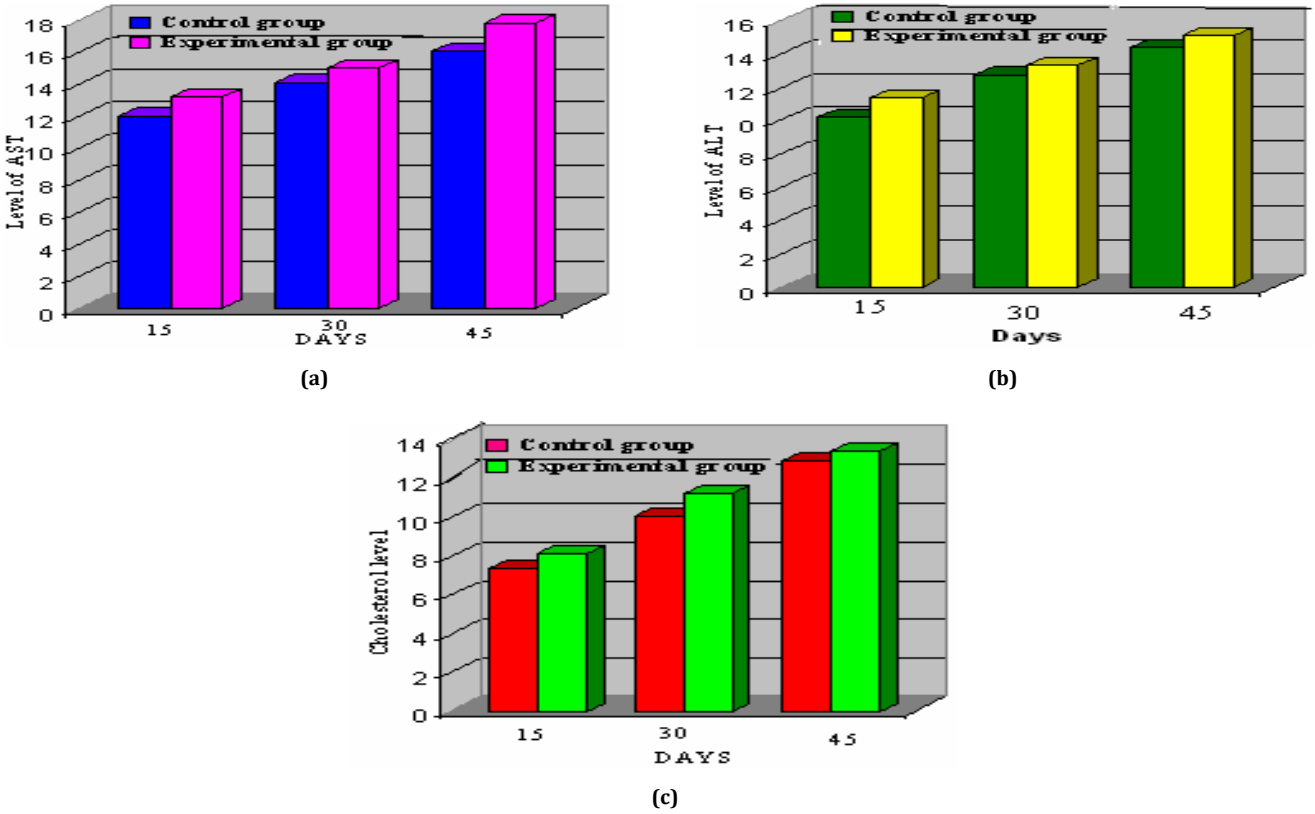

Fig. 1: (a) Histograms, showing the level of AST, (b) showing ALT and (c) showing Cholesterol contents in experimental group exposed to endosulfan in comparison to control group for 15, 30 and 45 days of exposur

CONCLUSION

The present study reveals that endosulfan might have affected cell metabolism and active transport of ions across cell membrane, cellular defence mechanism and detoxification system in liver. The results of the present findings suggest that endosulfan has adverse effects on liver functioning leading to physiological impairment.

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