International Journal of Science and Research (IJSR)
ISSN (Online): 2319-7064
Index Copernicus Value (2013): 6.14 | Impact Factor (2013): 4.438

Toxicity of Organophosphate Insecticide on Relative Body and Liver Weights of Mice

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Abstract: ***The present study deals with the changes in relative body and liver weights of mice treated with different doses of cythion (Organophosphate insecticide) ranging from 10, 50, 100 and 500mg/kg/day diet. Cythion concentration of 500 mg/kg/day diet at 90 days produced a significant increased in body weight as compared to untreated mice. Liver weight also showed dramatically more pronounced after 14th days till 90 days of treatment period as compared to control mice. An increased in the weight of liver and the concomitant increased in the activities of detoxifying enzymes suggest that the activities of the detoxifying enzymes on administration of cythion that may increased the weight of liver till 90 days of intoxication.***

Keywords: Cythion, liver, body weight.

1. Introduction

Many chemicals are now widely used in the control of pest are highly toxic and may be the hazardous to the health of men and animals. The insecticide chemicals undergo extensive metabolic change becoming rapidly broken down in almost every biological system. Degree of toxicity found very widely among compounds and animal species. Besides influencing factors which are governed by the structural and physical properties of the compounds, the rate of biotransformation major determinants that imposes variation in animal toxicity. A number of reviews dealing with all aspects of topic have appeared (Metcalf, 1966; Martyn and Martha, 1985; Pollack, *et al.*, 1991).

A finite number of processes and events are influential in the action of an insecticide from the time it first contacts the organism until the organism either dies or is safely beyond rise (O'Brion, 1967). The initial process must be penetration through the integument or other outer barriers in order for the toxicant to enter the general circulation of the organism. Some portion will generally be converted in one or several tissues to metabolites which may be more toxic (activation) less toxic (detoxication) than the parent compound. The possible effects of organophosphate and other insecticides on mammalian systems, this subject have been discussed by (Parker, 1992). Some chemicals damage various surfaces of the body, skin, eyes, lungs, kidney, liver, thyroid (Azri, *et al.*, 1990; Den, *et al.*, 1991) by direct contact, while many chemicals may be involved in inducing malformation or carcinogenic growth or causing damage to the genetic makeup of somatic or reproductive cells.

2. Material and Methods

Animals: Six week old mice were selected for experiment. Mice of either sex, each weighing between 12-18 g body weight, kept in 12 hr dark and 12 hr light cycle at room temperature in the range of 20 to 25^{o} C with constant relative humidity (80±5 %) were maintained with standard laboratory diet, water and *ad libitum*.

Treatment of Cythion: Mice were divided into 2 groups. Animals of group A were for a stock diet used as control. Animals of group B were divided into four subgroups were administrated cythion orally 10, 50, 100 and 500 mg/kg /day diet. Treatment duration was 90 days and the doses of cythion were terminated after 7, 14, 21, 28 and 90 days.

Toxicological studies: Mice from each were sampled after 7, 14, 21, 28 and 90 days of treatment from each dose group. The animals were watched for changes in behavior, food and water intake throughout the treatment period and terminal body weights were recorded.

Animals from each dose group were deprived of food and sacrificed at the end of 7, 14, 21, 28 and 90 days. They were stained by a blow on the head and operated. The liver was removed with adhering material by dipping in chilled normal saline. Liver was dried by blotting paper and weighted on digital balance for liver weight. Result is expressed as liver weight/gm of body weight.

Statistical analysis: Result is expressed as mean± SE, and student's t test was used for statistical significance.

3. Observations and Result

Body weights were changed during 90 days on cythion treated mice (Table 1 & fig. 1.1). Mice treated with cythion (organophosphate insecticide), showed an increased in body weight as compared to control mice, all four cythion concentrations 10, 50, 100 and 500mg slightly increased the body weight but on 500mg at 90 days produced a significant increased in body weight compared to untreated mice.

Table 1: Changes in body weight of mice exposed to cythion at different concentrations and different exposure periods.

Exposure period	*control*	*10mg*	*50mg*	*100mg*	500mg
7	25.4±1.649	23.1±1.864	23.2±1.539	22.6±1.431	23±1.783
14	25.3±1.384	23.8±1.783	24.5±1.309	23.9±1.860	24.9±1.113
21	24.9±1.243	24.3±1.339	24.9±1.430	24.5±1.549	25.4±1.546

28	24.8±1.488	24.9±1.688	25.5±1.330	25±1.390	26.3±1.773
90	24.6±1.456	26.1±1.243	27.8±1.564	27.3±1.897	28.3±1.321

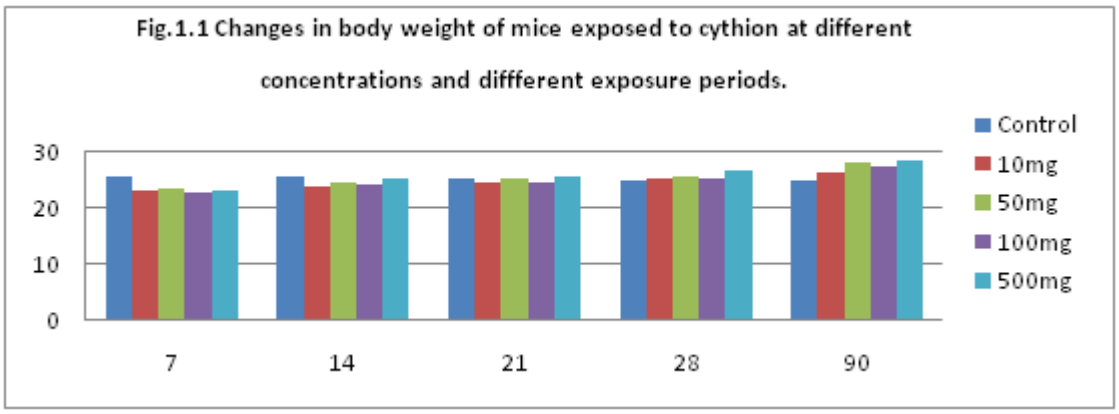
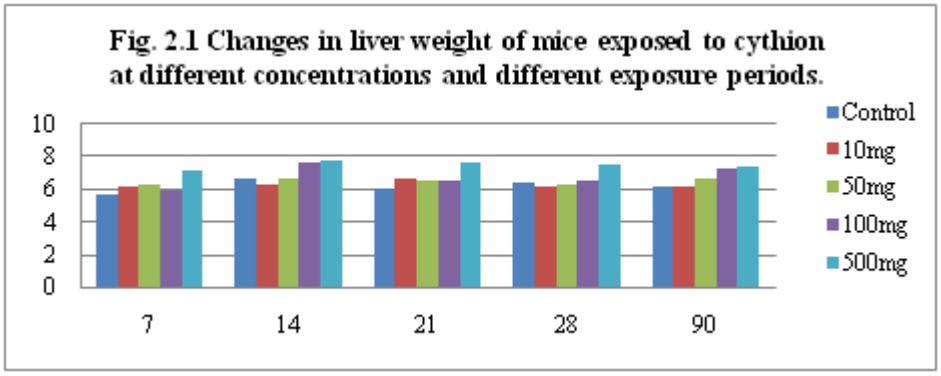


Table 2: Changes in liver weight of mice exposed to cythion at different concentrations and different exposure periods

Exposure period	*control*	*10mg*	*50mg*	*100mg*	*500mg*
7	5.7±1.723	6.20±1.928	6.40±1.868	6.00±1.839	7.20±1.783
14	6.76±1.847	6.3±1.239	6.76±1.112	7.67±1.229	7.80±1.560
21	6.134±1.348	6.67±1.336	6.534±1.769	6.6±1.236	7.667±1.698
28	6.476±1.836	6.267±1.433	6.334±1.627	6.534±1.488	7.60±1.730
90	6.2±1.339	6.26±1.436	6.2±1.539	7.34±1.689	7.467±1.370



In this present study, liver weights were increased in cythion treated mice (Table 2 & fig.2.1). Mice treated with cythion showed an increased in liver weight compared to untreated mice, after 7 days of treatment, all four concentrations 10, 50, 100 and 500mg, produced an increased in liver weight compared to control mice. Cythion concentrations of 100 and 500mg produced a significant increased in liver weight after 14, 21, 28 and 90 days of intoxication.

4. Discussion

Since insecticide are part of the diverse class of foreign compounds referred to as drug, they follow the general principles of penetration outlined for drug (Goodman and Gilman, 1965; Chasseaud, 1970; Fisher, *et al.*, 1990), following their oral ingestion by mammals, drugs may be absorbed from the mouth, stomach, or small intestine. The toxicity of insecticide was found to have been altered in rats pretreated with chlorinated insecticide, (Mandal, *et al.*, 1984) observed that rats pretreated with single oral dose of aldrin, chlordane and lindane acquired protection 4 days later against the oral toxicity of parathion.

The present data indicate that the alteration in the relative body and liver weight of the mice during insecticide intoxication could be due to the animal's ability to adapt to the toxic effects and also due to the rapid elimination of the compounds through rapid metabolism and excretion. We may in this connection note that it has been reported by (Thornton-Manning, *et al.*, 1994; Getal, *et al.*, 2001) that rapid degradation of the compounds does not allow the accumulation of toxic product in the mammalian tissues.

Relative increase in liver weight and slightly decrease in weight of kidney in male rats exposed to mancozeb (Reena, *et al.*, 1999). Increased in weight of liver, kidney, spleen and adrenal gland was also reported in rats, exposed to stomp-30 EC by (Ayub Shah, *et al.*, 1994). This study correlates with the present study, represents that all four concentrations of cythion studied 10, 50, 100 and 500mg/kg/day diet, produced an increase in liver weight compared to control mice, after 7 days of treatment. The toxicity of pesticide decreased with an increase in chain length of the compounds (Main, 1956). An increase in the weight of liver and the concomitant increase in the activities of drug metabolizing enzymes suggest that cythion administration on increased the liver weight up to 90 days of intoxication. Thus we may conclude that the pesticides affect the drug enzyme level by

disorganizing the components involved in the drug metabolism (Stevens, *et al.*, 1972). A selective review deals with the metabolism of vinylphosphate insecticide (Reynon, 1973).

5. Future Scope

Continuous use of pesticide has posed in serious threat to the environment and resulted in the direct and indirect effects on living organism. Some of the most effective pesticide is broad spectrum in action and they may in directly harm to living organism. Therefore, the study upon implementation will provide insight into the hazardous effect of pesticides on one of the important animal like mice. The research will also help the stake holder in the appropriate use of pesticide in agriculture.

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