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RESEARCH ARTICLE

CHANGES IN LIVER AND BODY WEIGHT OF MICE EXPOSED TO TOXICANT

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ABSTRACT

Malathion is one of the organophosphate pesticides which is toxic to animals. The present study deals with the changes in relative body weight and liver weight of Mice exposed to different doses of Malathion, ranging from 0.1, 0.5, 0.10 and 0.20 mg /kg/day diet. The result also showed the body weight continued to increase up to 90 days of intoxication and liver weight increase up to 28 days of intoxification later on slightly decreased at 90 days of experimental periods.

KEYWORDS

Mice,
Malathion,
liver,
body weight

INTRODUCTION

Malathion is organophosphorus pesticide extensively used to control a wide range of sucking and chewing pest of field crops, fruits and vegetables (Wankhade *et al.,* 2009). Many pesticides are toxic to mammals and other non- target organisms. The extent of hazard depends on the amount of residue and its toxicity. The persistence and extreme stability of organic pesticides in the environment are the ultimate source of contamination at the dietary level.

Many chemicals used in the pests are highly toxic and may be hazardous to the health of man and animals. Some chemicals damage various surface of body. Skin ,eyes, lungs, kidney, liver, thyroid (Azri *et al.,* 1981 ; Den Besten *et al.,* 1990) 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 cell.

The mechanism of pesticides toxicity is mainly by blocking of acetyl cholinesterase an enzyme which decompose acetyl choline, immobilization of this enzyme result in accumulation of excessive amount of acetyl choline in nervous tissue and muscular motor plates, as well as symptoms of endogenic poisoning by this neuro hormone. (Harlin and Dellinger, 1993).

Metabolism usually involves multiple steps, consisting of either separate pathway or sequential processes. A general trend of overall biotransformation is the conversion to more polar, hydrophilic substances. While the usually represents a detoxification process.

The main metabolizing organ is the liver. Hepatic microsomes constitute a preferential site of biotransformation, preliminary binding of the pesticides to microsomal sites being conditional for their subsequent degradation to proceed. This binding is reflected in changes of the microsomal pigment (Maslman *et al.,* 1972; Beverley *et al.,* 1981; Day *et al.,* 1992) cytocrome P – 450.

MATERIALS 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° c with constant relative humidity (80±5%) were maintained with standard laboratory diet, water and libitum.

Treatment of Malathion in Mice

Mice were divided in to 2 groups. Animals of group A were for a stack diet used as control. Animals of group B were divided in to four subgroups were administrated Malathion orally 0.1, 0.5, 0.10 and 0.20 mg /kg/day diet. Treatment duration was 90 days and the doses of Malathion were administrated till 7, 14, 21, 28, & 90 days respectively.

Toxicological studies

Five mice were sampled after 7, 14, 21, 28, & 90 days of treatment from each dose group. The animals were watched for changed behavior, food and water intake throughout the treatment period and terminal

body weights recorded. Animals from each dose group were deprived of food overnight and sacrificed at the end of 7, 14, 21, 28, & 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. Live 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:-

Results are expressed as mean ± SE, and student t test was used for statistical significance.

OBSERVATION AND RESULTS

Effects of Malathion were observed in this study. Body weight has been changed during 90 days on Malathion treated mice (table 1 & fig. 1) Mice treated with Malathion, showed an increased in body weight compared to control mice. All for Malathion concentration 0.1, 0.5, 0.10, 0.20 mg/kg/day diet, slightly increased the body weight compared to untreated mice. Malathion concentration of 0.5mg /kg/day diet at 90 days produced a significant increased in body weight as compared to control mice.

At the concentrations studied, liver weight were increased in Malathion treated mice (table 1 & fig 2), mice treated with malathion showed an increased in liver weight compared to untreated mice at all four concentration of Malathion (0.1, 0.5, 0.10 & 0.20 mg/kg/day diet) after 7, 14, 21 days of intoxication, at later sampling times, only Malathion concentration of 0.20 mg/kg/day diet at 28 days and 0.10 mg/kg/day diet at 21 days produced a significant increase in liver weight, after 28 days, at 90 days slightly decreased a liver weight in all treated mice as compared to control mice.

Table 1 Changes in Body and Liver weight of mice exposed to Malathion at different concentrations and different exposed periods.

Exposed periods	Control		0.1mg		0.5mg		0.10 mg		0.20 mg	
	Body weight	Liver weight	Body weight	Liver weight	Body weight	Liver weight	Body weight	Liver weight	Body weight	Liver weight
7	24.5 ± 1.444	6.5 ± .231	24 ±1.581	5.7 ± 1.398	24.7 ± 1.220	6.4± 1.439	24.8 ± .290	5.8 ± 1.611	24.5 ± 1.386	6.6 ± 1.235
14	25.4 ±1.84	5.75 ± .432	24 ±1.478	6.467 ±1.462	25.2 ± 1.840	6.734 ±1.712	24.9 ±1.320	6.934 ±1.783	24.8 ±1.228	6.76 ± 1.112
21	24.9 ±1.243	6.23 ± .476	24 ±1.228	6.267 ±1.560	25.8 ± 1.537	6.6 ± 1.632	25.4 ±1.486	7.6® ±1.439	25.5 ±1.456	7.0® ±1.910
28	25.3 ±1.384	6.1 ± .912	24.8 ±1.347	6.67 ± 1.360	26.1 ± 1.640	6.267 ±1.845	261.5 ±62	6.134 ±1.210	25.7 ±1.462	8.76® ±1.842
90	25.6 ± 1.549	5.9 ± .236	27.6 ±1.229	6.134 ±1.377	30.7® ±1.349	6.134 ±1.542	28.5® ±1.739	6.8 ±1.801	29.4® ±1.642	8.0 ± 1.561

® Value is statistically significant compared to control.

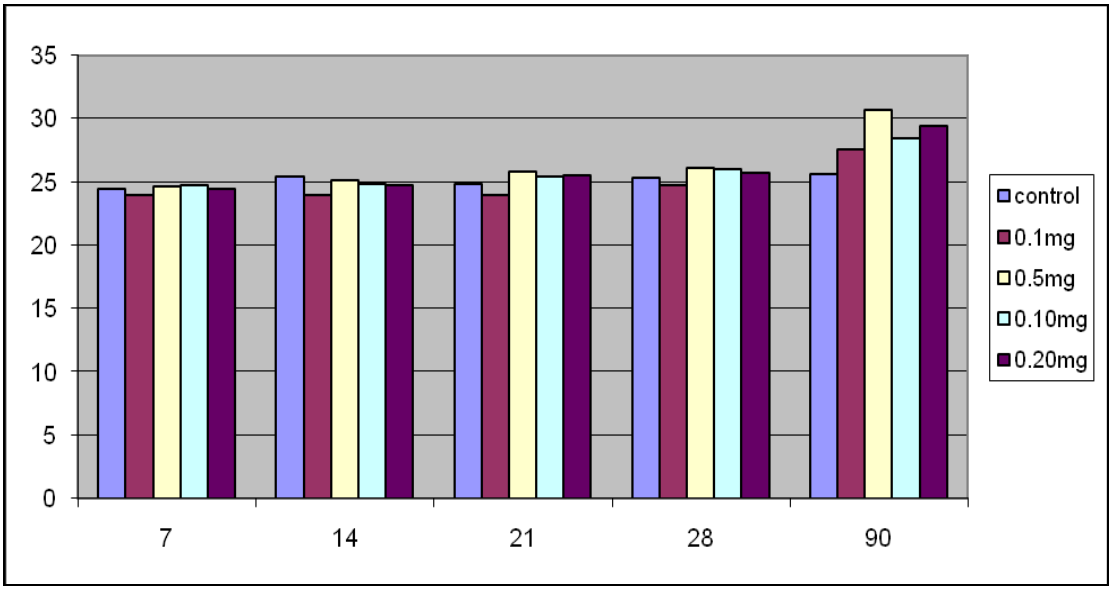

Fig 1: Changes in Body weight of mice exposed to malathion at different concentrations and exposed period.

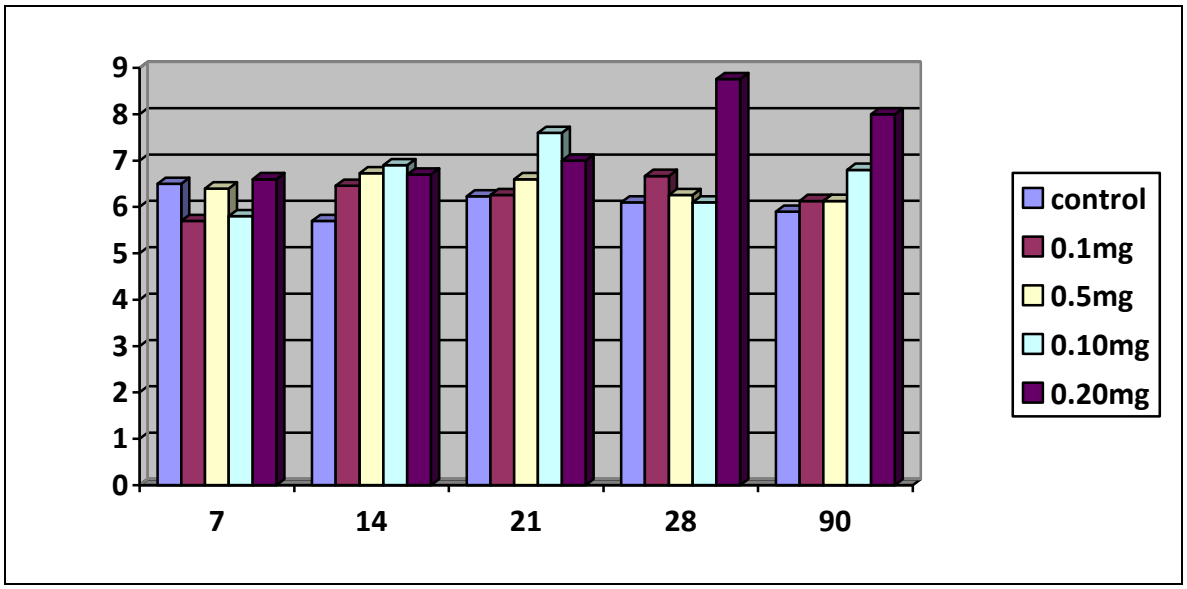

Fig 2: Changes in Liver weight of mice exposed to Malathion at different concentrations and exposed period.

DISCUSSIONS

Malathion can be regarded as a potential mutagen / carcinogen and requires further investigation. It has many structural similarities with naturally occurring compounds, and their primary target of action in insect in nervous system; it also inhibit the release of the acetyl cholinesterase at the synaptic junction (Cabello *et al.,* 2001). The result of the present study provides evidences that, the alteration in the relative body and liver weight of mice during intoxification. The body weight continued to increased up to 90 days of exposed period at different doses of malathion and liver weight increased up to 28 days and later on slightly decreased at 90 days of exposed periods. Parathion is a more potent cytotoxic compound for mice resulting in decrease of body and testicular weight (Sabarzo & Bustos, 2000). Endosulfan increased the weight of liver and hepato/somatic index (H S I : liver weight /body weight) significantly. (Ergul *et al*., 2006). Changes in the relative body & liver weight of mice during intoxication could be due to the animal ability to adapt to toxic effect and also due to the rapid elimination of the compound through rapid metabolization and excretion. We may in this connection note that it has been reported (Dorough, 1970 &Thornton *et al.,* 1991) that rapid degradation of the compound does not allow the accumulation of toxic product in the mammalian tissues. The present data indicate that the increased body weights were dramatically more pronounced in Malathion treated mice than control. A consolidated average poison consumption and average weight of kidney and liver of *mus musculus* after the exposure to bromadiolene were taken for control, 6, 12, 24 and 48 hrs. In the oral toxicity study, at 6 hrs. There was an increase in kidney and liver weight. This was statistically significant. Gross observation showed enlargement might be due to the rodenticide chemical poisoning. This was also reported by according to him swelling is the commonest and caused by bacterial toxin of chemical poison. (Revathi & Yogenandra, 2006)

CONCLUSION

We may conclude that the toxicity of pesticides decreased with an increased in chain length of the compound. An increase in the weight of liver and the concomitant increase in the activities of drug metabolizing enzyme suggest that administration on increased the liver weight up to 28 days of intoxication. Later on a slightly decreased of liver weight was noted in all mice, during pesticide intoxication. The decreased in the activities of drug metabolizing enzyme with increasing duration treatment of Malathion.

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