

A Alteration of Free Amino Acid in Mice Exposed to Toxicant

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Abstract

Amino acid and nitrogen metabolism are of the utmost importance in animals, since amino acids are essential intermediates in protein synthesis. In the present study, we found that the free amino acid content alters during dieldrin exposure for 90 days at four different concentrations. At 14 days exposure period free amino acid contents were observed less, which later on showed an ascending trend up to the end of the experiment. In the lowest concentration of same toxicant from 0.1mg/kg to 0.5mg/kg body weight of mice for 14 days produced non-significant result but same toxicant at highest concentrations dose (2mg/kg body weight of mice) produced a significant impact on the liver FAA of mice as compared to control. It was proved that the impact of dieldrin on mice was duration dependant.

Keywords: - Mice, liver, free amino acid, toxicant.

Introduction

After a food containing protein, the concentration of free amino acid in the blood is greatly increased and therefore the liver is subjected to repeated gross fluctuations in the supply of amino acids throughout the body. Liver is the animal's metabolic core and its disruption causes physiological and metabolic disturbance within the animal, any disruption in this system will definitely change the animal's physiological and metabolic disturbances. Protein metabolic functions in such a way that, can be used as alternative source of energy specially under the condition of stress [1-3].

Organophosphates affect many vital organs; chronic toxicity with organophosphorus pesticides may cause extreme injury in liver cells [4]. The possible effects of organophosphate and other insecticides on mammalian systems, this subject have been discussed by [5]. Pesticides are mainly applied in agriculture to protect crops from insects, weeds, and bacterial or fungal diseases during growth and to protect foods during storage from rats, mice, insects or diverse biological contaminants [6].

Pesticides have been reported to cause intoxications and deaths in many countries. It is reported that every year 3.000.000 severe intoxication and 220.000 death cases are observed in the world due to pesticides [7].

Materials and method

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 *ad libitum*.

Treatment of dieldrin: Mice were divided into 2 groups. Group A animals had been used as monitors for a stock diet. Group B animals were divided into four subgroups, and dieldrin was administered orally 0.1, 0.5, 1, 2mg / kg body weight / day. Treatment duration was 90 days and the doses of dieldrin were terminated after 7, 14, 21, 28 and 90 days.

Toxicology studies: Mice were sampled from each dose group after 7, 14, 21, 28 and 90 days of treatment. 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 category were deprived of food and sacrificed for 7, 14, 21, 28 and 90 days at the end. They were stunned 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. Estimation of free amino acid by Danilson and Harold (1958) method. The outcome is represented as body weight / gm liver.

Statistical analysis: Data were described by proportion, mean, SD, range etc. The data were statistically analyzed by using one way analysis of variance (ANOVA). The Statistical analysis was done by using student t test for estimation of significant results in experimental and control group of rat. P value of <0.05, was considered as significant,

Results

It is evident from (table and fig. 1) that the free amino acid changes during dieldrin exposure for 90 days at four different concentrations. Present study result showed that at the lowest concentration of dieldrin from 0.1mg/kg body weight of mice to 0.5mg/kg body weight of mice for 14 days produced non-significant result but same toxicant at highest concentrations dose (2mg/kg body weight of mice) produced a significant impact on the liver FAA of mice as compared to control.

Table 1 Changes in liver free amino acid of mice exposed to dieldrin at different concentrations and different exposure periods.

Exposed Periods/ toxicant	Control	0.1 mg	0.5mg	1mg	2mg
7	29.90±1.63	30.51±1.06	28.28±1.86	27.56±1.88	29.14±1.46
14	30.90±1.07	28.59±1.11	24.02±1.26	23.14±1.37	22.66±1.58
21	29.14±1.79	44.81±1.47	49.15±1.95	45.38±1.36*	44.63±1.07
28	29.66±1.69	49.81±1.06	52.72±1.36	49.18±1.64	50.00±1.22*
90	30.98±1.37	53.63±1.88*	54.52±1.44*	53.22±1.54*	56.16±1.64*

Significant result shows *P≤0.05

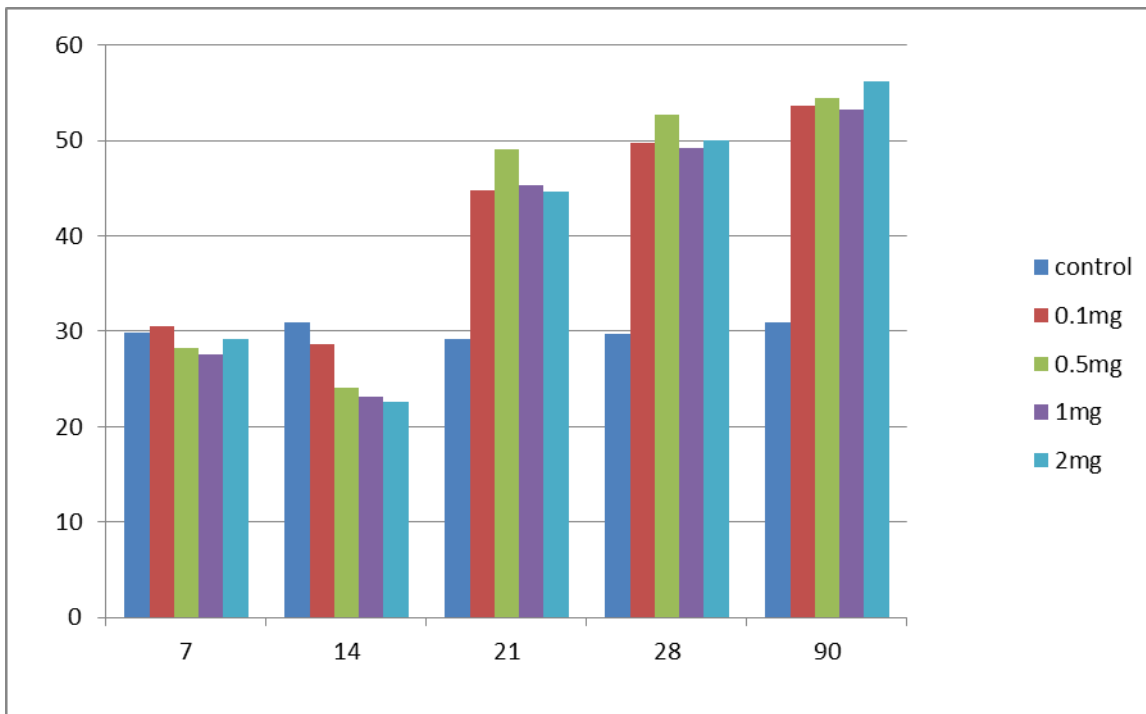


Fig. 1 Changes in liver free amino acid of mice exposed to dieldrin at different concentrations and different exposure periods.

Discussion

The present study, the effect of dieldrin had been studied in mice. In mammals the acute toxicity of dieldrin is primarily of central nervous origin [8] proposed that dieldrin is converted to an active metabolite. Free amino acid content of mice showed decreased at 14 days of treatment period may be due to protein synthesis and increased with increasing exposure time. The increase after 14 days may be due to enhanced proteolysis or synthesis of free amino acid, when there was deficit of glycogen content, these amino acids might be source of energy. Increase or decrease in free amino acid may be considered as the operation of the stress phenomenon at the tissue level [9]. In the present study, similar result was observed in mice exposed to toxicant.

In mice increase in free amino acid may be due to degradation of protein synthesis or may be due to diminished utilization of amino acids in the liver tissue or their enhanced synthesis from other sources like

glucose and fatty acids. Such increase was also noted in different animals like wolf [10], crab [11] and prawn [12]. The increased level of free amino acid might also be due to increase synthetic potentiality. The changes of amino acid level as a result of the insecticide effect caused a reduction in the protein concentration which means that dieldrin may cause cessation of protein synthesis.

Conclusion

In mice, we observed that free amino acid was decreased at 14 days of experimental period. Later on increase in free amino acid content up to the end of the experiment. The level of free amino acid increase in liver of mice after intoxication of dieldrin may be due to increased proteolysis in mice that leads to increase free amino acid levels. The increased free amino acid may be partly utilize for the protein synthesis and partly for glyconeogenesis, through the transamination reactions and transdeamination reactions to supply the necessary keto acids to act as a precursors for the maintenance of

carbohydrate metabolism to meet the energy demand during stress condition.

Conflicts of interest: The authors stated that no conflicts of interest.

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