

STUDY OF PHORATE TOXICITY BY ANALYSIS OF ELECTROLYTES AND UREA IN SERUM OF ALBINO RATS

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ABSTRACT

Oral administration of freshly prepared doses of Phorate (O,O, diethyl S-ethyl thio methyl phosphorodithioate) was sprayed. Which were then fed to albino-rats once in a day and five times in a week for a period of 21 days administration of phorate sprayed soybean showed biochemical changes in serum of albino rats. The value of blood urea were decreased from 35.5 to 29.8 mg/dl and significant change in Na⁺ and K⁺ level found to be 157.8m Eq/L and 6.81 m Eq/L respectively.

Keywords: Phorate toxicity, electrolytes, urea, serum and albino rats.

INTRODUCTION

The application and frequent use of organophosphorus insecticides has resulted in their wide spread distribution in the environment and has been shown to exert deleterious effect on the biological system. The phorate (O,O, diethyl S-ethyl thiomethyl phosphorodithioate) has proved in part three decades as one of the potent tools for chemical control of insects though the effect of this insecticide on mammal has not been studies well.

Organophosphorus pesticides has been known to adversely affect the kidney and adrenal gland. The disfunction of adrenal gland and kidney reflects the change in electrolyte concentration of serum. Higher potassium level exhibited the Cardio toxicity, with idea in mind toxicity of phorate has been studied by analysis of electrolytes and urea concentration of serum.

MATERIAL AND METHODS

Fifty male albino rats of charles - foster strain (200 ± 10gm body weight) were used in this study rats were acclimatized do standard laboratory condition on two weeks before experiments. These rats were equally divided in five groups of 10 each.

Equal number of rats from each group were administered (control) 100, 500, 1000, 5000 ppm of phorate separately through soybean upto 15 days.

Treatment of soybean was done by freshly prepared solution of phorate and was applied on the basis of ppm weight of grains. A constant and uniform spray of insecticide was made and each treated lot of soybean was stored in air tight container at room temperature for minimum 8 days. At the end of the experiment, rats were anaesthetized by ether. There after blood from each rat was collected through cardiac puncture using EDTA rinsed glass syringes.

The blood urea was estimated according to the method prescribed by March *et al.*¹ we have used spectrophotometric method for Na⁺ and K⁺ analysis sodium and potassium assay is based on modified maruna² and Trinder's method³.

RESULTS AND DISCUSSION

Perusal of Table -1 indicate that the phorate administration brings about the changes of the level of blood urea and a significant depletion in blood urea was found ($p < 0.01$) of ranged between

Table - 1: Showing the alterations in the level of blood urea in the blood of rats following the administration of different doses of phorateValues are mean \pm SD

Grain	Parameter	Control	Doses				Percent change
			100 ppm	500 ppm	1000ppm	5000 ppm	
Soybean	Blood urea	35.5 \pm 6.9	35.1 \pm 6.6	34.6 \pm 6.9	33.2 \pm 5.8	29.8 \pm 6.4	16.05

(Value are expressed mg/dl)

Table - 2: Showing the alteration in the level of electrolytes in the blood of rats following the administration of different doses of phorateValues are mean \pm SD

Grain	Parameter	Control	100 ppm	500 ppm	1000ppm	5000 ppm
Soybean	Sodium	159.8 \pm 0.59	159.8 \pm 5.17	159.69 \pm 7.44	159.4 \pm 8.49	158.2 \pm 15.90
	Potassium	5.31 \pm 0.94	5.30 \pm 0.54	5.53 \pm 0.69	5.9 \pm 1.07	6.88 \pm 1.52

(Value are expressed mg/dl)

35.5 and 29.5 mg/dl for the found different doses the total decrease in blood urea was 16.05%

Perusal of Table - 2 indicate the most significant changes were observed in treated soybean fed rates. Here the sodium and potassium level found to be 158.2, 6.88 respectively. Zaidi *et al.*⁴ also reported a decrease in blood urea level and serum creatinine due to organophosphorus poisoning in albino rats.

Organophosphorus pesticides have been known to adversely effect the kidney and adrenal gland⁵ (emergency gland), the gland which secretes aldosterone cortisone, adrenaline etc. The disfunction of adrenal gland and kidney reflects the changes in electrolytes concentration of serum.

Zaidi *et al.*⁶ found no significant change in serum Na⁺ and K⁺ after administration dimecron (2-chloro-2-diethyl carbomol-1-methyl vinyl dimethyl phosphate) but in the present investigation a significant change in serum Na⁺ and K⁺ concentration observed in those rats which get higher dose of phorate (1000-5000). Bentley⁷ reported that the above 6.5 m Eq/L potassium level indicated the cardio toxicity. Result of last group of present experiment directly correlate the above finding in which 5000 ppm phorate grains rats exhibited serum potassium above 6.5 m Eq/L. Present result showed significant change in urea and electrolytes concentration. Here sodium level and urea level decreases with the increment of potassium level. These results exhibit the cardio toxic adrenal gland and kidney disfunction of phorate at different doses.

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