

EFFECTS OF ORAL ADMINISTRATION OF BHC ON THE BLOOD ENZYMES OF RABBITS

Pages with reference to book, From 220 To 223

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Abstract

The effects on the blood enzymes of rabbits were ascertained by daily oral administration of 25 mg BHC per kg body weight for twelve weeks. The amount of BHC in the blood increased progressively and reached a maximum of 86.012 µg per ml. The levels of enzymes were elevated though there was a nonsignificant increase in the pH value of the blood of the treated group. An increase of 0.323 and 0.587 units of acid and alkaline phosphatases, respectively, was observed for every one microgram per accumulation of BHC in the blood. The analysis of blood for enzymes AST and ALT, indicated that one microgram of blood BHC increased the two enzymes by 0.344 and 0.697 units. The treated group of rabbits showed many behavioural abnormalities. (JPMA 37: 220 , 1987).

INTRODUCTION

The increasing use and the presence of insecticide residues in food materials is creating many problems in the public health sector. Hexachlorocyclohexane (BHC) is a mixture of several isomers. Gamma-BHC is most toxic to insects. BHC is outstanding for its speed of action as well as high acute toxicity as a stomach fuming poison. Long term exposure to BHC has been found to cause liver damage and disturbances of central nervous system. Previous work^{1,2} on the residues of insecticides described the effects of endrin. The present paper discusses the feeding effects of BHC on the blood enzymes of rabbits.

MATERIAL AND METHODS

Fifteen adult rabbits were divided into two groups, control (A) and treated (B). Group A was fed stock diet throughout the experimental period of twelve weeks. BHC was additionally, fed daily to the rabbits in group B at a dose of 25 mg/kg body weight. One rabbit from group A and two from group B were selected randomly at start of the experiment and at weekly intervals thereafter for the collection of blood from jugular vein.

BHC extracted from blood³ was estimated quantitatively by thin layer chromatographic technique.⁴ All the four enzymes were estimated by Merckotest Kits. At the end of four weeks one rabbit from group A and two from group B were slaughtered. Their livers were analysed⁵ for any accumulation of BHC. The procedure of slaughtering was repeated after every fortnight till the end of twelve weeks.

RESULTS AND DISCUSSION

A group of rabbits was fed daily BHC at the rate of 25 mg per kg body weight for twelve weeks. The analysis of blood and liver for BHC accumulation indicated that BHC was present only in the blood of treated rabbits. The amount increased progressively and reached a maximum of 86.012 µg/ml of blood in twelve weeks (Figure 1).

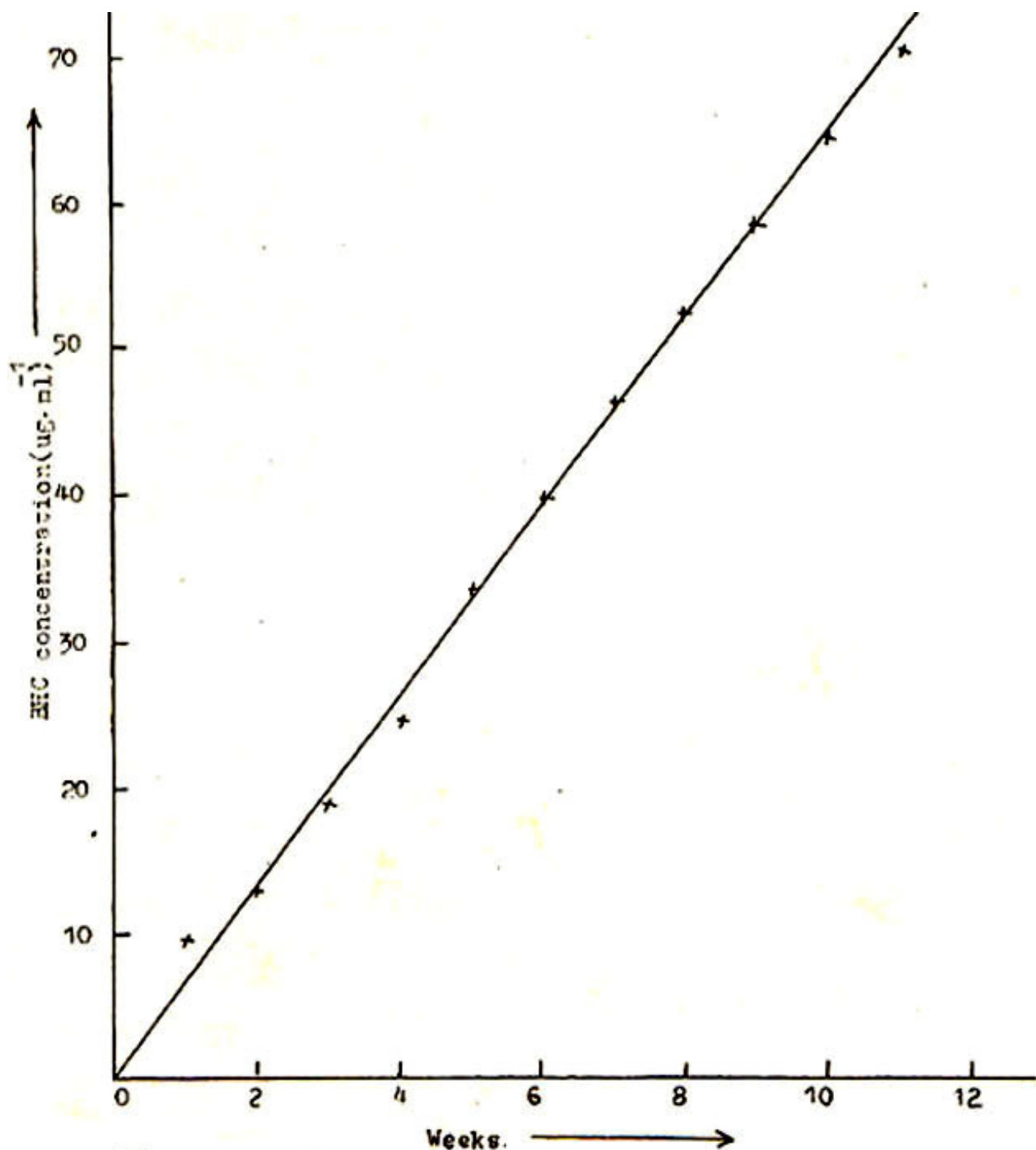


Figure 1. Blood concentration of BHC in rabbits.

Other studies^{6,7,8} also showed that the concentration of BHC in blood increased with the passage of time. Rabbits in the control group behaved normally but many abnormalities were observed in the animals of the treated group, e.g., falling of hair especially on the neck portion, progressive weakness, loss of appetite, hypersensitivity and excitement. Other reports⁹ reveal similar but more acute symptoms on administering chlorinated hydrocarbons to buffalo calves.

The blood pH values of the rabbits in the control group remained fairly constant 7.15-7.72, whereas those of the treated group varied from 7.38 to 8.06 throughout the experimental period of twelve weeks. Statistical comparison of these values showed that the accumulation of BHC in the blood had

no significant effect on this blood value.

The analysis of acid and alkaline phosphatases (Table 1)

TABLE – 1
Levels of Acid and Alkaline Phosphatases in Blood of
Rabbits, fed 25 mg BHC per kg Body Weight.

Weeks	Acid phosphatase (I)*		Alkaline phosphatase (I)*	
	Control	Treated	Control	Treated
1.	50.5	50.5	66	70
2.	50.5	53.53	66	74
3.	50.5	57.57	65	79
4.	50.5	59.59	66	82
5.	50.5	61.61	64	83
6.	50.5	63.63	66	88
7.	50.5	65.65	65	92
8.	50.5	67.67	65	96
9.	50.5	69.7	66	102
10.	50.5	71.71	66	106
11	50.5	73.73	66	110
12.	50.5	75.75	66	114

* I is the amount of enzyme which catalyzes the transformation of one micro mole of substrate per minute under standard conditions.

revealed that the levels of both the enzymes increased with the passage of time. The increased levels of blood phosphatases might be attributed to necrosis and degeneration of liver cells which were observed

during histopathology of the livers. The results are similar to those reported in the literature^{10,11} The increased values of phosphatases due to the BHC accumulation in the blood of treated rabbits were used to fit the regression lines (Figures 2 and 3)

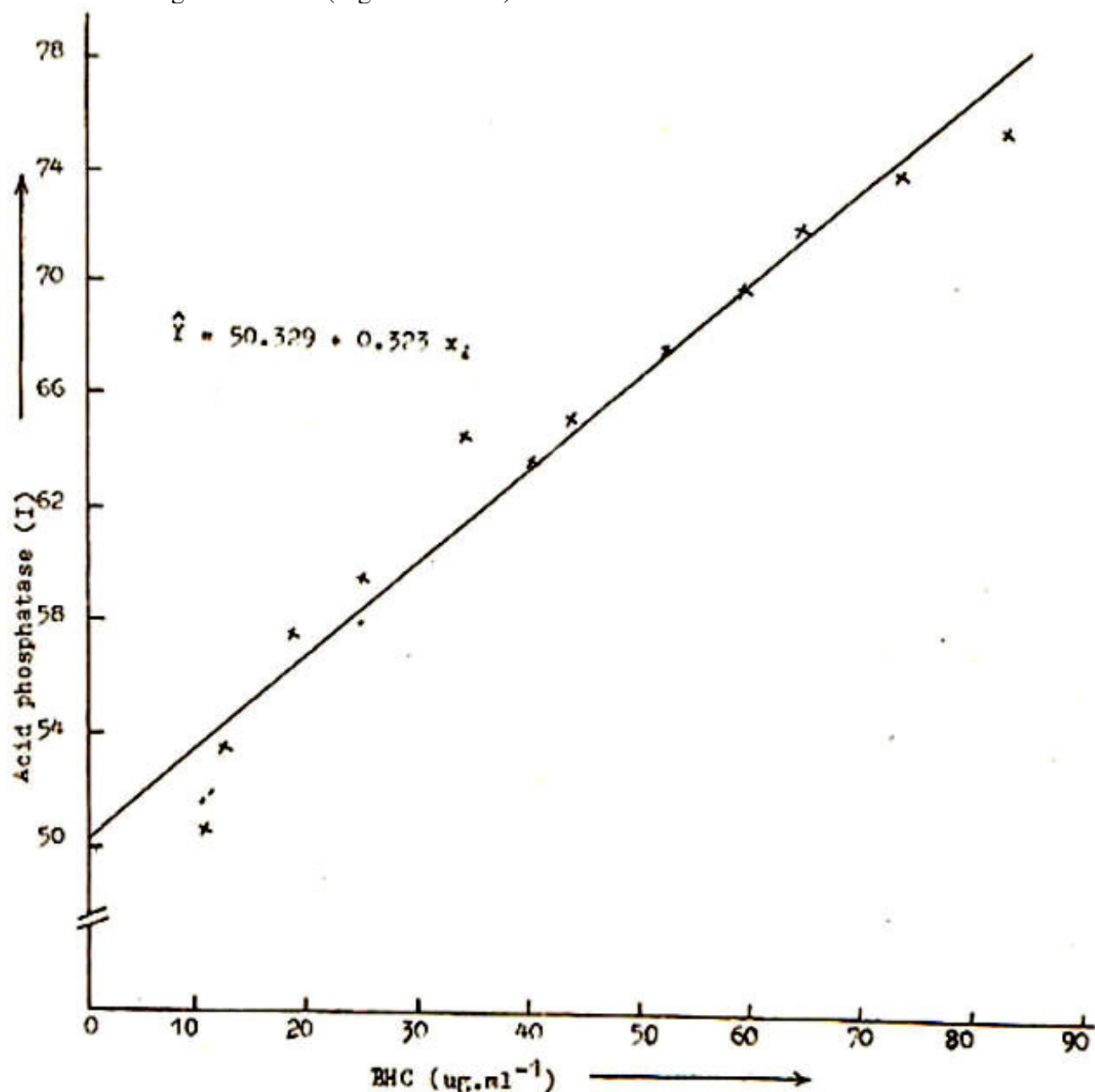


Figure 2. Effect of BHC on the activity of acid phosphatase.

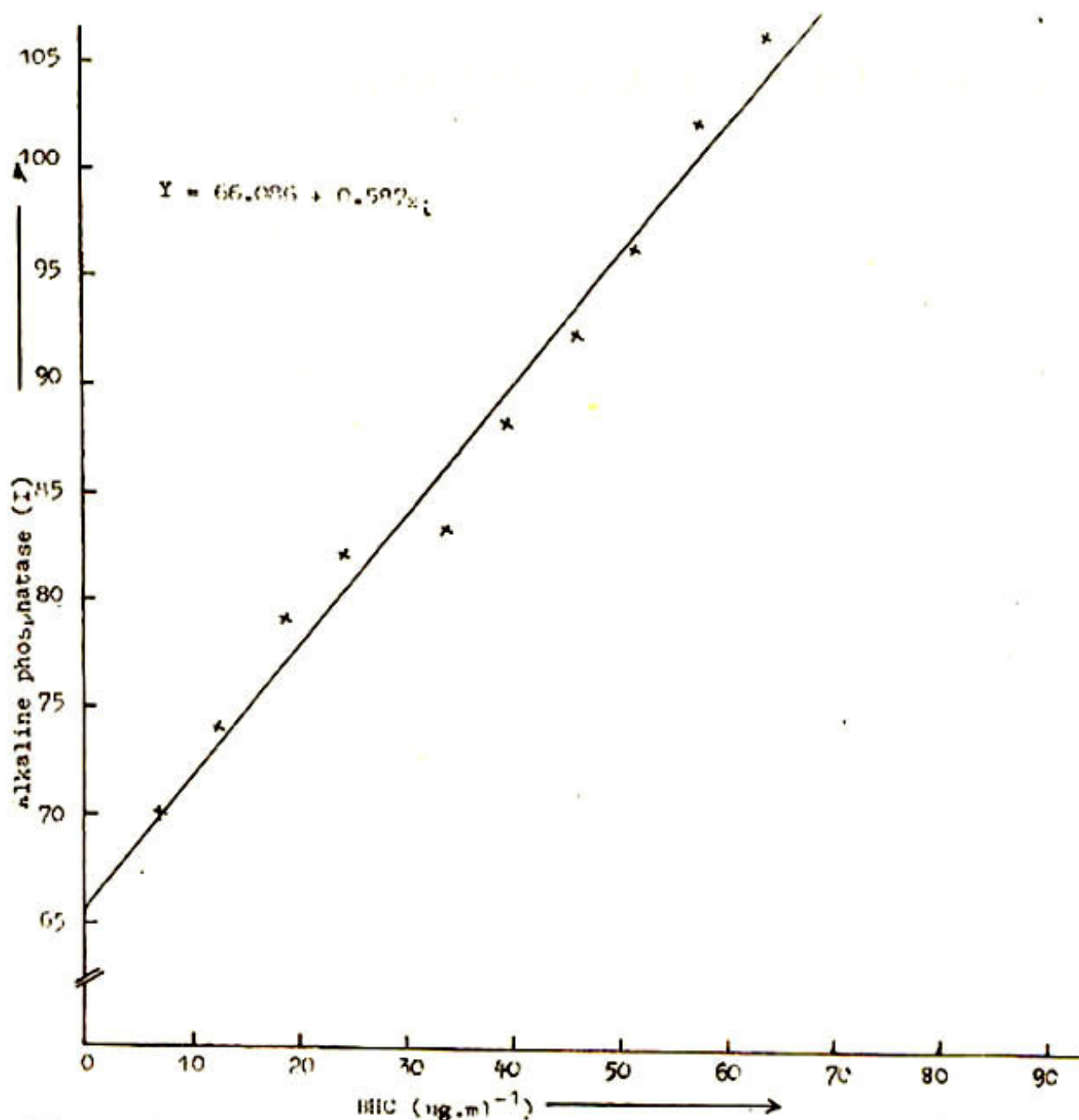


Figure 3. Effect of BHC on the activity of alkaline phosphatase.

which indicated that for every one microgram per ml accumulation of BHC in the blood, a corresponding 0.587 units of the enzyme were increased respectively.

The blood was also analysed for the levels of enzymes, aspartate amino transferase (AST) and alanine amino transferase (ALT). The results (Table II)

TABLE – II
Levels of AST and ALT in the Blood of Rabbits,
fed 25 mg BHC per kg Body Weight.

Weeks	AST (I)*		ALT (I)*	
	Control	Treated	Control	Treated
1	29	29.5	42	49.0
2	29	31.0	46	54.0
3	30	32.0	40	58.0
4	30	32.0	44	60.0
5	30	34.5	40	66.0
6	30	38.0	46	71.5
7	28	40.0	42	78.0
8	30	44.0	46	86.0
9	30	45.5	42	88.0
10	30	49.0	42	91.5
11	30	50.0	41	95.0
12.	30	55.0	40	99.0

***I is the amount of enzyme which catalyzes the transformation of one micro mole of substrate per minute under standard conditions.**

revealed that the levels of both the enzymes were elevated due to BHC administration though the levels of these enzymes in the control group remained fairly constant. The findings of other workers^{12,13} also reveal similar results.

The elevated values of the enzymes due to the accumulated BHC in the blood, were used to fit regression lines (Figures 4 and 5)

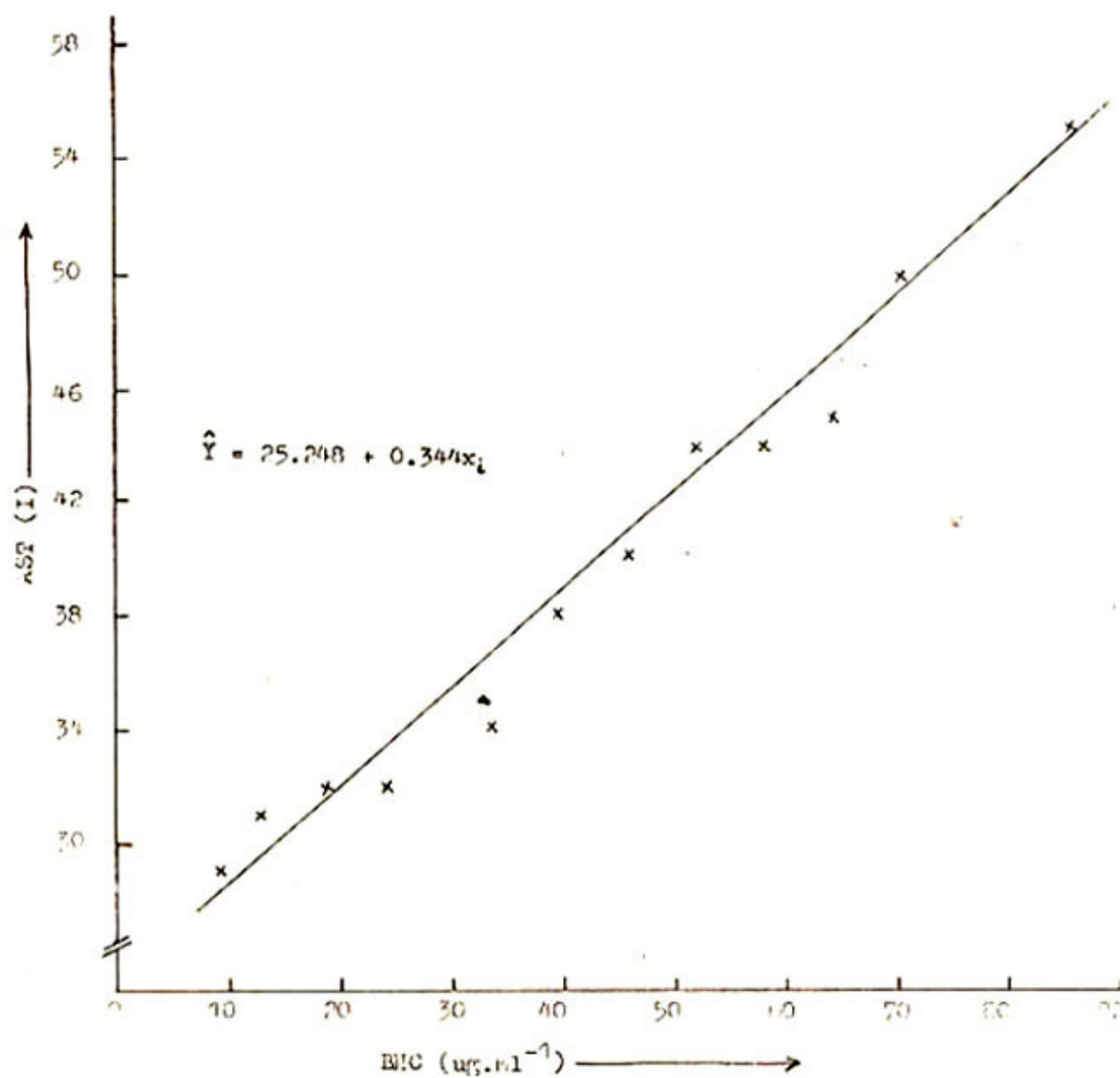


Figure 4. Effect of BHC on the activity of AST.

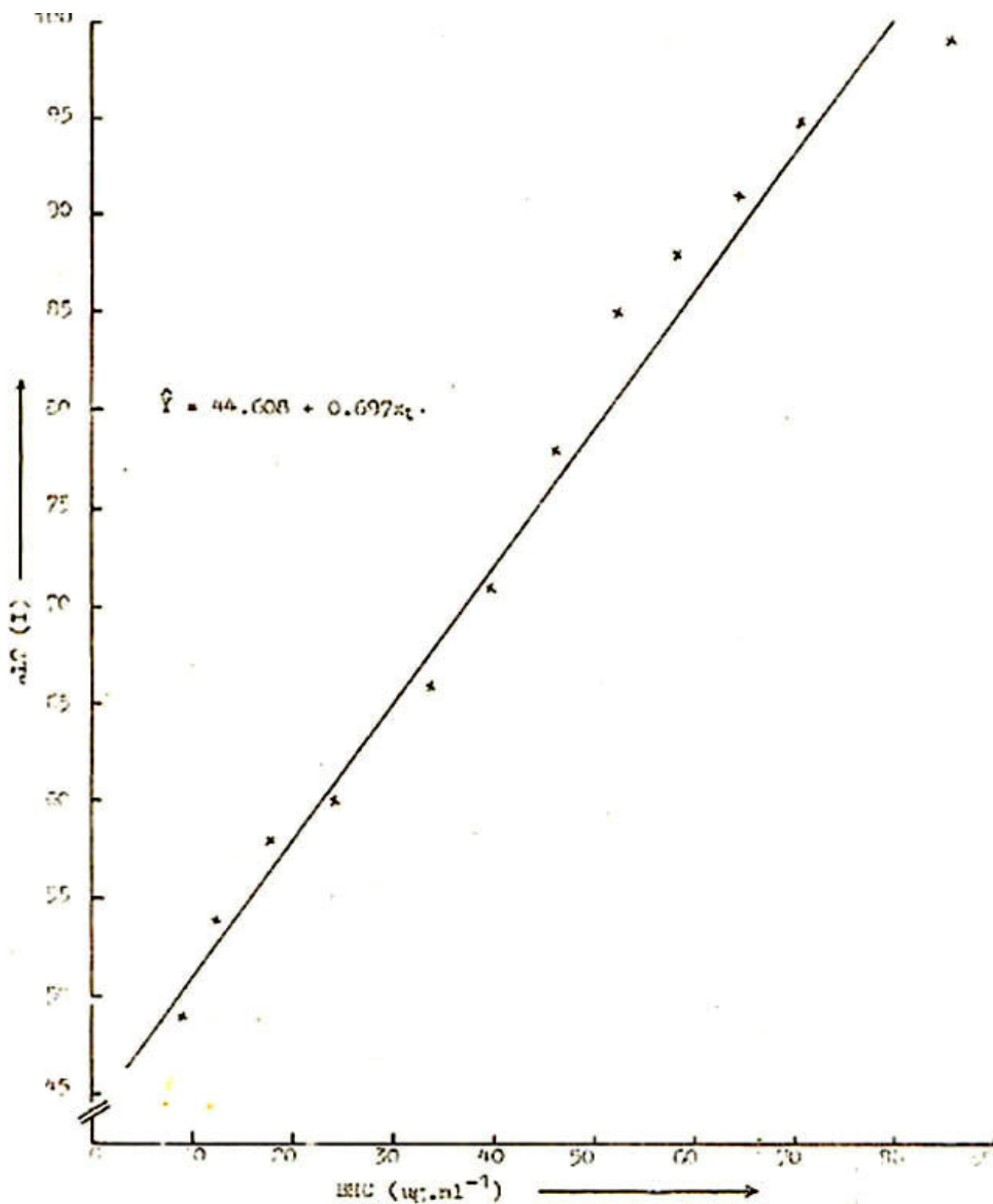


Figure 5. Effect of BHC on the activity of ALT.

which revealed that for every one microgram per ml accumulation of BHC in the blood a corresponding 0.344 and 0.697 units of the two enzymes were increased respectively.

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