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THE DELAYED EFFECT OF 4 RODENTICIDES ON LIVER FUNCTIONS

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INTRODUCTION

The sublethal dose is very dangerous for rondent control operations. Rodent can recover from the effect of the poison after a relatively short time.

Man and his demesticated animals are subject to the risk of exposure to anticoagulant rodenticides used for rodent control and they may exhibit the same symptoms as rodents do when they exposed to sublethal doses of anticoagulant rodenticides, **(Farag, 1982).**

Estimation of the acute oral toxicity of the chlorophacinone, Coumachlor, Coumatetralyl and Warfarin followed by periodic determination of alkaline phosphatase, cholestrol, GOT, and GPT in the serum of mice were done to detect changes in the level of these enzymes and their delayed effect on liver functions.

MATERIAL AND METHODS

Rodenticides used

1- Chlorophacinone $C_{23}H_{15}ClO_3$
Trade names, Caid, Liphadione, Raviac, Quick, CX-14.

2- Counmachlor $C_{11}H_{15}ClO_4$
Trade name, Tomarin.

3- Coumatetralyl $C_{19}H_{16}O_3$.
Trade name, Racumin 57.

4- Warfarin $C_{19}H_{16}O_4$.
Trade names, warfarin, Coumafene.

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Table (1): The effect of a single oral dose with 1/10 LD_{50} of Rodenticides in serum of albino mice on GPT U/ml.

Rodenticides	Dose used mg/kg	Normal Values U/ml.	Periods in hours								
			1	6	12	24	48	72	96	120	144
Chlorophacinone	1.2	16.2±1.9	16.9	22.3	32.4	36.4	36.3	30.1	30.1	27.9	24.2
Coumacnlor	15.5	16.2±1.9	16.8	21.9	31.9	36.2	35.1	29.3	28.7	26.4	22.9
Coumatetralyl	1.4	16.2±1.9	17.7	23.2	33.3	35.9	35.3	31.7	29.4	25.1	23.4
Warfarin	0.4	16.2±1.9	16.9	22.8	32.8	36.3	34.2	28.9	27.5	23.3	21.7

Animal tested:

Adult male albino mice (Mus musculus) weighing 18-22 grams each, obtained from a strain reared at the central Agricultural Pesticides Laboratory were used

Enzymes tested:

1- Alkaline phosphatase

Kind et al. (1954) and Belfield and Goldberg (1971)

2- Cholestrol, **Watson (1960).**

3- Glutamic-Oxaloacetic transaminase (GOT),

Reitman and Frankel (1957).

4- Glutamic-pyruvic acid Transaminase (GPT),

Reitman and Frankel, (1957).

Methods

The acute oral toxicity of each material used was determined by giving a single dose of the material dissolved in corn oil. For each material, five concentrations were prepared. Each concentration was administrated orally to males albino mice. The mortalities were calculated according to **Weill (1952).**

80 males albino mice, divided into 4 groups (20 each) were kept in standard cages. Each group was given orally a single dose of 1/10 the LD_{50} previously measured (acute oral toxicity) of each rodenticide used. At intervals of 1, 6, 12, 24, 48, 72, 96, 120 and 144 hrs. after administration of the single dose, 2 mice were taken and slaughtered for collecting blood samples in tubes containing sodium-EDTA. Blood samples were immediatly centrifuged at 3000 rpm. for 10 min. The sera were removed and stored at 20°C pending analysis.

The changes in the level of 4 enzymes in mice blood were determined by Colorimetric methods using PYE Unicam SP 600 Series 2 spectrophotometer.

Results were recorded in Tables (1, 2, 3 and 4).

Table (3): The effect of a single oral dose with 1/10 LD50 of Rodenticides in serm of albino male mice on Cholestr

Rodenticides	Dose used	Normal Values	Periods in hours								
	mg/kg	m mol/L.	1	6	12	24	48	72	96	120	144
Chlorophacinone	1.2	95.9± 4.6	120	136	169	182	180	177	175	179	170
Coumacnlor	15.5	95.9±4.6	150	188	200	210	215	200	185	178	166
Coumatetralyl	1.4	95.9±4.6	133	190	210	230	266	240	232	210	190
Warfarin	0.4	95.9±4.6	146	200	233	267	300	295	290	285	282

Table (2): The effect of single oral dose with 1/10 LD_{50} of Rodenticide in serum of albino male mice on alkaline phosphatase U/ 100 ml.

Rodenticides	Dose used	Normal Values	Periods in hours								
	mg/kg	U/ 100 ml	1	6	12	24	48	72	96	120	144
Chlorophacinone	1.2	6.5±1.2	7.5	7.7	6.9	7.2	8.3	8.1	7.9	8.5	8.2
Coumacnlor	15.5	6.5±1.2	8.3	7.9	7.8	8.9	9.3	8.7	7.3	9.4	9.1
Coumatetralyl	1.4	6.5±1.2	7.2	7.4	8.9	8.9	9.5	9.7	9.2	10.1	9.9
Warfarin	0.4	6.5±1.2	7.9	8.5	7.9	9.4	9.9	8.7	8.9	9.5	10.2

Table (4): The effect of a single oral dose with 1/10 LD_{50} of Rodenticides in serum of male albino mice on GOT U/ml.

Rodenticides	Dose used mg/kg	Normal Values U/ml.	Periods in hours						
			1	6	12	24	48	72	96	120	144
Chlorophacinone	1.2	17.5±1.5	18.1	23.7	24.1	19.9	19.2	18.4	19.1	19.0	18.6
Coumacnlor	15.5	17.5±1.5	19.4	22.3	29.7	32.1	28.4	28.1	25.3	22-6	19.4
Coumatetralyl	1.4	17.5±1.5	20.1	27.6	33.6	35.3	33.8	29.4	27.7	24.6	20.9
Warfarin	0.4	17.5±1.5	19.1	25.4	34.2	36.9	36.2	30.4	29.3	26.8	24.6

DISCUSSION

The effect of administration of a single oral dose with 1/10 LD_{50} of different rodenticides to male albino mice is recorded in Table (1, 2, 3 and 4).

The results indicated that the level of various enzyme activities elevated in sera during a period of 144 hrs. after giving the rodenticides.

GPT was highly elevated in sera 24 hrs. after treatment with different rodenticides when compared to sera where it was within the control level (Table,1).

Concerning alkaline phosphatase, it was slightly elevated in sera 48 hrs. after given the rodenticides (Table, 2).

Cholestrol was highly elevated in sera 48 hrs.after administration of rodenticides (Table , 3).

Got was silightly elevated 24 hrs. in sera after given chlorophacinone while it was highly elevated 24 hrs. after given other rodenticides, (Table, 4).

From the obtained results, it was found that, the effected level of GOT and alkaline phosphatase recovered to near the normal values 144 hrs. after given the rodenticides to mice. However, GPT level and cholestrol level not recovered to the normal values up to 144 hrs.

Cholorophacinone was found to be the first rodenticide resulted in recovery of the affected level of all enzymes to near the normal values followed by coumachlor, Coumtetralyl and Warfarin.

The Ld_{50} value for the anticoagulant racumin 57 on wild rodents was higher for females as compared with males of Rattus and Arvicanthis species,**(Salit et al, 1975).**

It worth to mention that, not only the toxic hazards of poisoning, but also sublethal doses might inflict serious

disorders on man and his useful animals.

SUMMARY

The delayed effect of 4 anticoagulant rodenticides was studied on liver function.

The rodenticides tested were, Chlorophacinone, Coumachlor, Coumatetralyl, and Warfarin.

Periodic determination of alkaline phosphatase, cholestrol, GOT and GPT in the serum of mice were done to detect changes in the level of these enzymes.

The effected level of GOT and alkaline phosphatase recovered to near the normal values 144 hrs. after giving the rodenticides to mice. However, GPt level and cholestrol level not recovered to the normal values up to 144 hrs.

Chlorophacinone was found to be the first rodenticide resulted in recovery of the affected level of all enzymes to near the normal values followed by coumachlor, coumatetralyl and Warfarin.

The toxic hazards of poisoning and sublethal doses may inflict serious disorders on man and his useful animals.

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الملخص العربى

التأثير المتأخر لاستخدام الجرعات غير القاتلة لمانعات التجلط على وظائف الكبد

د • مصطفى عبد السميع الهراوى ، د • محمد أنور مرزوق ، أ • د / لبيب اسماعيل موافى

اجريت هذه الدراسة لتتبع تأثير الجرعات غير القاتلة من مانعات التجلط على وظائف الكبد لجرز المختبر الأبيض •

وقد استخدمت فى الدراسة مانعات التجلط الآتية :
الكلوروفاسينون ، الكوماكلور ، الكوماتتراليل ، الوارفارين •

قد اثبتت الدراسة أن تعرض الجرذان لعشر الجرعات غير القاتلة من مانعات التجلط تؤدى الى تغييرات فى مستوى الانزيمات الاتية فى سيوم جرذ المختبر الأبيض

Alkaline phosphatase
Cholesterol
GOT
GPT

كما وجد ان مستوى هذه الانزيمات المتغيرة يعود لقرب حالته الطبيعية بالتتابع عند استخدام الكلوروفاسينون ثم الكوماكلور والكوماتتراليل وأخيرا الوارفارين •

ومن هذه الدراسة يتضح أيضا أنه من المحتمل أن يكون لتلك الجرعات تأثير ضار على الانسان وعلى الحيوانات النافعة عند تعرضها لتلوث بيئى ينتج من استخدامها •