THE DELAYED EFFECT OF 4 RODENTICIDES ON LIVER FUNCTIONS

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INTRODUCTION

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

Man and his domesticated 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, cholesterol, 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, Liphadinone, Raviac, Quick, CX-14.

2- Coumachlor C_{11}H_{13}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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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. (1956) 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 male 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 LD₅₀, 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 immediately 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>
<thead>
<tr>
<th>Rodenticides</th>
<th>Dose used (mg/kg)</th>
<th>Normal Values (U/100 ml)</th>
<th>Periods in hours (1-144)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chlorophacinone</td>
<td>1.2</td>
<td>6.5±1.2</td>
<td>7.9 7.7 6.9 7.2 8.3 8.1 7.9 8.5 8.2</td>
</tr>
<tr>
<td>Coumacnlor</td>
<td>15.5</td>
<td>6.5±1.2</td>
<td>8.3 7.9 7.8 8.9 9.3 8.7 7.3 9.4 9.1</td>
</tr>
<tr>
<td>Coumatetralyl</td>
<td>1.4</td>
<td>6.5±1.2</td>
<td>7.2 7.4 8.9 8.9 9.5 9.7 9.2 10.1 9.9</td>
</tr>
<tr>
<td>Warfarin</td>
<td>0.4</td>
<td>6.5±1.2</td>
<td>7.9 8.5 7.9 9.4 9.9 8.7 8.9 9.5 10.2</td>
</tr>
</tbody>
</table>

Table (2): The effect of single oral dose with 1/10 LD₅₀ of Rodenticide in serum of albino male mice on alkaline phosphatase U/100 ml.

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<table>
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<th>Rodenticides</th>
<th>Normal Values (mg/ml)</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Warfarin</td>
<td>9.9±4.9</td>
<td>1.2 1.6 2.2 4.6 9.6 12 16 24 30 48 72 96 120 144</td>
</tr>
<tr>
<td>Coumacnlor</td>
<td>9.9±4.9</td>
<td>1.2 1.6 2.2 4.6 9.6 12 16 24 30 48 72 96 120 144</td>
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</table>

Table (3): The effect of a single oral dose with 1/10 LD₅₀ of Rodenticides in serum of albino male mice on cholesterol (mg/ml).

Zagadaa et al. 51
**DISCUSSION**

The effect of administration of a single oral dose with 1/10 LD₅₀ 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).

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

Got was slightly 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 affected level of GOT and alkaline phosphatase recovered to near the normal values 144 hrs. after given the rodenticides to mice. However, GPT level and cholesterol level not recovered to the normal values up to 144 hrs.

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

The LD₅₀ 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, Coumatrelpyl, 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 affected level of GOT and alkaline phosphatase recovered to near the normal values 1/4 hrs. after giving the rodenticides to mice. However, GPT level and cholestrol level not recovered to the normal values up to 1/4 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, coumatrelpyl and Warfarin.

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

REFERENCES


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التأثير الساخن استخدم أم البروتين غير القاطع
لمعالجة الماء وظائف الكبد

د. محمد عقدي، د. محمد برازوق، د. محمد طه، د. طه مسلم، د. طه مسلم

إجراء هذه الدراسة لêt ét تأثير الجرعة غير القاطعة من مرتبطات الماء على
وظائف الكبد وجرز المختبر الأيض.

قد استخدمت في الدراسة مجموعات الماء مكافئة من هذه الجرعة:
- الجلودي: الكبكريل، الكبكريل، البروتين
- الكبكريل: الكبكريل
- الكبكريل: البروتين

قد أثبتت الدراسة أن مركب الجرعة تمثل الجرعة غير القاطعة من مرتبطات
الماء، أن تغيرات في مستوى الانتيكات في سير جرد المختبرات.

Alkaline phosphatase
Cholesterol
GOT
GPT

كما وجد أن مستوى هذه الانتيكات المتغيرة يعود قرب حالتة الطبيعية بالانتشار
عند استخدام الكبكريل. راجع الكبكريل والبروتين ودب توازن.

رسن هذه الدراسة أن مشهور أيضًا أنه من المثير أن يكون لهذا الجرعة تأثير
غير إنسان وظل الحيوانات النابعة عند تطبيقات تطوره بدوره، وينتج
استخدامها.