قسم: طب الحيوان.
كلية: الطب البيطرى ـ جامعة أسيوط.
رئيس القسم: أ.د./ ابراهيم سيد احمد .

دراسة التأثير السمي الحاد والسميه تحت المزمنه لمبيد القواقع (البايلوسيد) على أسماك بلطي النيل

عادل شحاته ، ثابت عبدالمنعم ، عبدالعزيز شعبان

ترجع أهمية دراسة التسمم بمادة البايلوسيد الى التوسع في استخدامها كمبيد لقواقع البلهارسيا (من الأمراض المتوطنه) في مياه النيل وذلك للتأكد من تاثير هذا المبيد السمي على الكائنات المائيه الحيه الموجوده في المياه ، ولذلك فقد قام الباحثون بهذه الدراسة على سمك البلطي لأنه يعد من أهم المصادر البروتينية في الغذاء المصرى.

اجرى هذا البحث على عدد ٢٤٨ من اسماك بلطي النيل. وزن السمكه يتراوح ما بين ١٠٠ـ ١٥٠ جم قد تم اقلمة هذ الاسماك على المعيشه المعمليه لمدة اسبوعين على الأقل.

وقد قام الباحثون بتحديد الجرعه الوسيطه للسميه الحاده المميته (ج ح م ٥٠)بطريقة (ليتشفيلد وولكوكسون) وقدرت ٣٦٦ جزى في المليون.

أوضحت نتائج البحث بالنسبة للسميه تحت المزمنه انخفاضا معنويا في تركيز الهموجلوبين وفي عدد كرات الدم الحمراء خاصة في الاسابيع الأخيرة من التسمم. أما النسبة المئوية لكرات الدم البيضاء فقد ارتفعت معدلات الكرات محبه للحامض ارتفاعا لزمه انخفاض معنوى في الخلايا الليفاوية . اثبتت النتائج ايضا وجود انخفاض أنشطة الانزيمات المقاسه في الاسبوع السادس من التجربة وارتفاعها معنويا في الاسبوع الأول.

من الدراسة السابقة يتضح لنا أن الجرعه الوسيطه للسميه الحاده المميته (٣٦٦ر. جزء في المليون) تقل كثيرا عن التركيز المستخدم لمقاومة البلهارسيا (جزء في المليون) وهذا يشير الى مدى خطورة استعمال هذا المبيد على اسماك البلطي وغيره من الكائنات الحيه المائيه لأنه يؤدى الى ارتفاع نسبة النافق منها وزيادة على ماقد يحدث للمستهلكين من اضرار جسيمه ، لذ فاننا نهيب بالمسئولين التوسع في دراسة التأثير السمي لهذا المبيد.

Dept. of Animal Medicine,
Fac. of Vet. Med., Assiut University.
Head of Dept. Prof. Dr. I.S. Abdallah.

ACUTE AND SUBCHRONIC TOXICIY SIUDIES OF BAYLUSCIDE IN TILAPIA NILOTICA FISH

(With 4 Tables and One Figure)

By
A. SHEHATA, TH. A. IBRAHIM and A.A. SHAABAN

(Received at 30/12/1985)

SUMMARY

The present study were carried out to investigate the toxic effects of the moulluscicide (Bayluscide) in Tilapia nilotica fish. The LC_{50} of bayluscide in Tilapia nilatica fish was 0.366 ppm.

Subchronic toxicity study was carried out by daily inoculation of 1/10 LC_{50} dose for six weeks. The changes in blood constituents in both acute and subchronic toxicity studies were recorded. Also the activities of Alk. phosphatase. GPT, and GOT enzymes were investigated.

INTRODUCTION

Today, one of the serious problems in the world is environmental pollution. In recent years the extensive use of pesticide in Egypt has caused many problems due to contamination of the environment especially the aquatic system. The exposure of fish to moulluscicides hazards constitute one of the important factors responsible for the great loss of a good source of animal protein, which is one of the serious prolems especially in developing countries.

The practice of bilharziasis control in Egypt. by direct introduction of the moulluscicide "Bayluscide" into rivers, canals, and lakes for destruction of schistosomiasis snails, may cause toxicity or death, not only to snails but also to fish.

Consequantely, a knowledge of the toxicity of the moulluscicide "Bayluscide", is necessary to protect aquatic life especially of fish, and to establish a safe use patern for this chemical.

However, the available studies on the toxic effects of Bayluscide in fish was done in the United States of America by MARKING and HOGAN (1967). The absence of similar studies in Egypt attracted us to study both acute and subchronic toxicity of Bayluscide in Tilapia nilotica which considered as one of the important types of fish widely consumed as a protein source by the Egyptian peoples.

MATERIAL and METHODS

Bayluscide was obtained from Bayer, Cairo scientific office as wettable powder containing 70% active ingredient.

Tilapia nilotica fish weight from 100-150 gm. each, were used during our toxicological studies. The fishs were obtained from El-Ibrahimia canal at Assiut locality and acclimatized

to laboratory conditions at least two weeks before experimental testing. Teteramine fish feed (Tetra, Dr. BAENSCH, Malle, West Germany) was twice daily ad-libidum and withold three days prior to introduction to bioassay to empty the gut (According to United States Department of Interior fish and wildlife Service Report, 1964).

The LC_{50} was determined LITCHFIELD and WILCOXON method (1949), preliminary trials were carried out on 96 Tilapia nilotica fish, divided into 12 groups (8 fish each). Fish were subjected to different concentrations of Bayluscide ranging from 0.3 ppm. up to 0.425 ppm., except one group was used as a control. For test proper 72 fish were divided into 9 groups (each contain 8 fish), and subjected to different concentration ranging from 0.3125 to 0.400 ppm. except the control group.

The aquaria were 12, all glass basin with 40 litre capacity each. The test medium of water was about 25°C temperature and pH 6.9.

Acute toxicity studies of Bayluscide on Tilapia nilotica fish were carried out by subjecting 40 fish to 1/2 LC_{50} (0.183 ppm) for one week. Blood samples were taken from 5 fish, after 12, 24, 48, 72, 96 hours and One week. R.B.Cs. count, differential leucocytic count and Hb % were calculated after GRADWHOL (1956).

In subchronic toxicity studies, 40 fish were sujected to 1/10 LC_{50} (0.0366 ppm) for six weeks. Blood samples were taken from five fish every weeks for R.B.Cs. count differential leucocytic count, Hb % and enzymes analysis. Alkaline phosphatase, SGOT a, d SGPT activities were determined after BESSEY et al., (1946) and BERGMEYER and BERNT (1974) respectively. In all methods test kits were used (Boeheringer Mannkeim GmbH Diagnostica, West Germany).

Statistical analysis of the data was calculated according to KALTON (1967).

RESULTS

Preliminary trials for LC_{50} determination of Bayluscide in Tilapia nilotica fish showed that mortality started at 0.3125 ppm., while the LC 100 mortality was at 0.4 ppm.

The test proper indicated that, the LC_{50} with 19/20 confidence limits was 0.366 (0.351 - 0.381) ppm. of Bayluscide (Table 1 and Fig. 1).

DISCUSSION

The Tilapia nilotica fish has been chosen among others as this species plays an important role in the researsh programme of fish culture in Egypt on an economic basis.

The LC_{50} determintion is considered the most important data obtained to demonstrate acute toxicity of any pollution to fish. At this dose, level death is rapid stimulating what happens in field condition as a result of short-term exposure to lethal concentrations due to careless appliction. The acute toxicity in our study recorded the LC_{50} of Bayluscide as 0.366 ppm. in Tilapia milotica fish. BATHE et al., (1974) classify pesticides on the basis of 96 hours LC_{50} to fish intending to give indication of the possible toxicity of pesticide to fish under practical conditions. They classified them into highly toxic (LC_{50} less than 0.5 ppm), toxic (0.5 - 5 ppm), slightly toic (5 - 50 ppm) and non toxic (more than 50 ppm). According to the previous classification. Bayluscide may be listed under the highly toxic pollutant to Tilapia nilotica fish.

Our LC figure is in agreement with MARKING and HOGAN (1967) whom showed that Bayluscide was highly toxic to different types of fish in the united State of America.

The ministry of health in Egypt used Bayluscide at 1 ppm in the flowing water as a mulluscicide, so we must throw light on the great loss occurring in fish which are considered as one of the main sources of protein supplement in our food.

The effect of Byluscide on blood constituents need further investigation, to clarify its toxic action, especially in the consumers, fed on a fish intoxicated with Baylucide.

Our results of subchronic toxicity studies revealed a significant increase in the activities of GPT, GOT, and alkaline phosphatase enzymes in the first week. The activities were significantly inhibited at the end of the experimental duration. The early elevation of the enzymes activities may be due to stimulation of liver microsomal enzymes as recorded by MURPHY, (1966).

REFERENCES

Bathe, R.; Sachesse. K.; Ulmann, L.; Hormann, W.D.; Zak, F. and Hess, R. (1974): The evaluation of fish toxicity in the laboratory 16th meeting of the Burppean society for the study of drug toxicity.

Bergmeyer, H.U. and Bernt, E. (1974): Method of enzymatic analysis 2nd ed. Verlag Chemi Weinheim and Acadamic press. Inc. New York and London.

Bessey, O.A.; Lowry, O.H. and Broch, M.J. (1946): Method for rapid determination of akaline phosphatase with 5 cubic millimeters of serum. J. Biol. Chem. 164 : 321.

Gradwahl, R.B.H. (1956): Clinical laboratory methods and diagnosis 5th Ed. C.V. Mosby Company St. Louis, U.S.A.

Kalton, G. (1967): Introduction to statistical ideas from scientists, 2nd ed. Addison Willey Rubl. Inc. London.

Litchfield, J.T. JR. and Wilcoxon, F. (1949): A simplified method of evaluating dose effect experiments. J. Pharm. Exp. Ther. 96 : 99.

Marking, L.L. and Hogan, J.W. (1967): Toxicity of Bayer 73 to fish. United States Dept. of Interior, Bureau of Sport Fisheries and Wildife. 36, Washington, April, 1967.

Murphy, S.D. (1966): Response of acaptive rat liver enzymes to acute poisoning by organophosphate insecticides. Toxicol. Appl. Pharmac. 8, 266.

United States Department of Interior Fish and Weildlife Service (1964): Procedure for evaluation of acute toxicity of pesticides to fish and wildlife.

Table (1)

Solution of the dose responce curve of Bayluscide to Tilapia nilotica fish

Dose ppm	Response	observed %	Expected %	Observed minus expected	Contribution to (Chi)
0.3125	1/8	12.5	4.5	8.0	0.150
0.3250	2/8	25.0	11.0	14.0	0.180
0.3375	2/8	25.0	19.0	6.0	0.025
0.3500	3/8	27.5	31.0	6.5	0.021
0.3625	3/8	37.5	45.0	7.5	0.025
0.3750	4/8	50.0	60.0	10.0	0.045
0.3875	7/8	67.5	73.0	5.5	0.018
0.4000	8/8	100(95.3)	85.0	10.3	0.140

Table (2)

Effect of acute exposure for one week at 1/2 LC dose of Bayluscide on R.B.Cs. count, differential leucocytic count, and Hb % (mean ±S.E.) of Tilapia nilotica

Time of the dosing	Hb (g/100 ml)	R.B.Cs. million	Differential leucocytic count				
			Lymphocyte %	Acidophil %	Basophil %	Monocyte %	Neutrophil %
12 H.	8.5± 0.00	2.007± 0.433	58.66±16.8	10.66±2.31	5.66±2.52	3.33±0.57	23.66±10.26
24 H.	8.20±0.50	1.950± 0.461	58.00±1.00	3.50±2.12**	1.50±0.70	2.00±1.00	35.00±17.07
48 H.	8.50±0.00	1.805,000 ±0.150	55.50±2.12	2.00±0.00**	3.50±1.50	4.00±0.00**	35.00±12.07
72 H.	8.22±1.087	2.345± ±0.165	75.50±3.53	2.50±0.70**	2.00±1.5	2.00±1.50	22.0±11.30
96 H.	8.23±0.25	2.345,000 ±0.165	48.00±12.24	1.50±1.00**	2.00±1.5	1.50±1.00	22.0±11.30
7 days	8.20±0.13	1.500,000* ±0.466	58.00±1.00	3.50±1.98**	3.50±1.80	3.00±2.00	32.00±10.65
Control	9.70±1.40	2.538.000 ±0.247	68.40±7.50	12.40±3.71	6.20±3.42	1.0±0.82	12.00±2.54

Table (3)

Effect of subchronic exposure for six weeks at 1/10 LC dose of Bayluscide on R.B.Sc. count, differential leucocytic count, and Hb% (mean ±S.E.) of Tilapia nilotica

Time (week)	Hb g/100 ml	R.B.Cs. (Million)	Differential leucocytic count				
			Lymphocyte %	Acidophil %	Basiophil %	Neutrophil %	Monocyte %
1	7.80±0.141	2.375±0.148	37.75±9.287**	43.50±9.57**	5.50±3.00	13.25±4.272	-
2	7.60±1.40	1.830±0.41	44.66±4.163**	38.66±2.30**	6.66±3.05	10.00±2.00	-
3	7.50±0.707	1.385±0.106**	40.25±10.96	39.75±9.46**	4.75±1.26	15.25±4.35	-
4	7.30±0.605	1.596±0.365	38.25±5.66*	37.75±6.56*	6.75±2.36	17.25±5.44	-
5	6.56±0.929	1.233±0.230**	36.25±8.995**	39.25±11.87	6.75±4.35	17.75±4.86	-
6	6.40±1.084*	1.645±0.334*	20.66±5.727	55.80±8.10**	2.60±1.34	20.80±6.06	-
Control	9.70±1.40	2.538±0.247	68.40±7.5	12.40±3.71	6.20±2.42	13.00±2.549	1.00±0.82

** Significant at $p < 0.01$ * Significant at $p < 0.05$

Table (4)

The effect of subchronic exposure for six weeks at 1/10 LC_{50} of Bayluscide on S-GPT, and Alkaline phosphatase enzymes activities of Tilapia nilotica fish (unit/ml.)**

Time post exposure (week)	Alk. phosphatase	S-GPT	S-GOT
1	13.02±2.31*	87.64±16.20*	62.75±8.19*
2	10.95±1.78	47.72±12.07	50.22±11.17
3	8.76±2.02	35.65±13.49	38.71±10.12
4	8.92±3.04	44.06±9.86	57.11±12.80
5	8.88±5.05	40.06±9.91	27.41±7.51*
6	4.56±1.622*	17.50±0.50*	33.03±3.84*
Control	9.223±3.00	49.00±1.154	56.00±13.79

* Significant at p 0.05

** Note: One kind and king unit is that amount of enzyme whcih int he given conditions liberates / mg of phenol in 15 minutes at 37°C (Alkaline phosphatase).

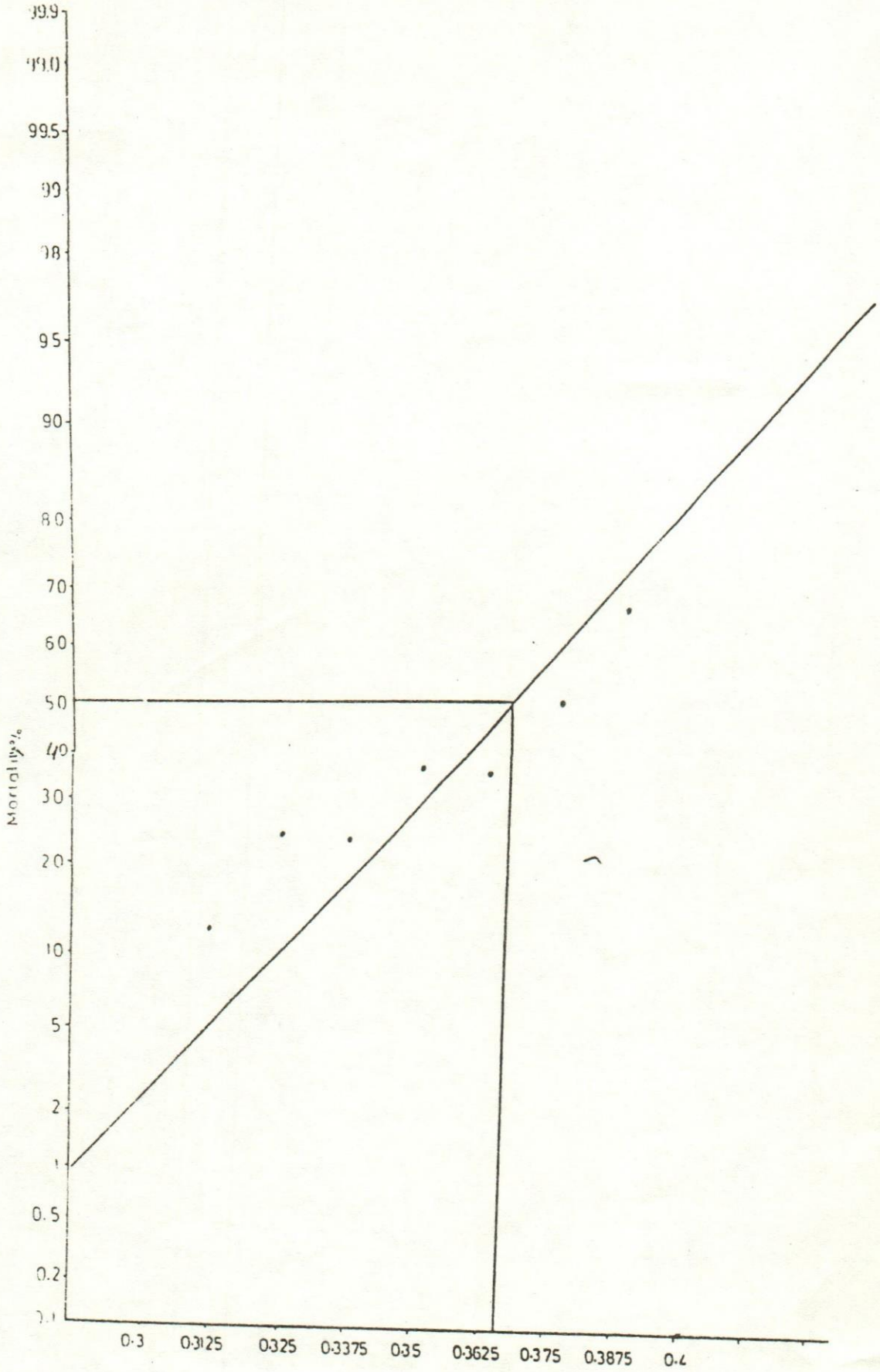

Fig. (1)

The relationship between doses of dayluside and mortality % in tilapia nilotica fish.

(Dose Mortality Curve)