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COMPARATIVE STUDY ON THE TOXIC EFFECT OF SHORT – TERM INTRAPERITONEAL ADMINISTRATION OF SOME INSECTICIDES ON HAEMATOLOGY AND BLOOD BIOCHEMISTRY PARAMETERS OF MALE ADULT ALBINO RATS

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ABSTRACT

The present study was conducted to investigate and compare the intoxication effects of daily interaperitoneal injection of 1/10 LD_{50}/Kg. Body Wt. of Fenpropathrin, Dimethoate, Thiocyclam and Thionex for 5 days on complete blood picture and biochemical parameters of adult male albino rats. The daily intraperitoneal injection of any of the four insecticides for 5 days caused a significant increase in white blood cell count(WBC)which reach its maximal value of 101.7%, 85.6%, 63.9% and 9% compared to the control level.Fenpropathrin,Thiocyclam and Thionex showed a general decrease in red blood cell count (RBC), whereas Dimethoate produced significant increase in RBC count after two and five days of administration. The effect of Fenpropathrin, Thiocyclam and Thionex on hemoglbin content was parallel to their action on RBC count.

Hematocrit value showed a general decrease in response to the tested insecticide except in Dimeothate insecticide, on the other hand, the mean corpuscular volume (MCV) was generally increased in Dimethoate, and hriocyclane insecticide compared whereas Fenpropathrin and Thionex produced a general decrease in MCV after two and five days of administration.

Fenpropathrin, Dimethoate, Thiocyclam and Thionex produced a general decrease in mean corpuscular hemoglobin (MCH) after 2nd and fifth days of administration. In addition administration of Fenpropathrin, Dimethoate, Thiocyclam and Thionex caused, in general, decrease in mean corpuscular hemoglobin concentration (MCHC) during all the experimental periods. Finally, blood platelets count (PLT) showed general increase in response to Fenpropathrin, Dimethoate, Thiocyclam and Thionex administration. The daily intraperitoneal administration of any of the four insecticides for five days caused a general increase of urea and uric acid concentration in rat's blood serum compared to the control level. In general, creatinine concentration in rat's blood serum increased in response to the daily intraperitoneal injection of insecticides. Glucose content of rats blood serum showed different fluctuations in response to insecticides administration. In general, results indicated a general increase in serum cholesterol and triglycerides content at the different time intervals studied.

It is possible to conclude that insecticides administration for 5 days, even at low doses i.e. 1/10 LD_{50}/kg. Body wt., had harmful effects on blood, kidney and liver.

INTRODUCTION

The environmental contamination by insecticides, due to their extensive use in agriculture, has become a serious problems. In fact, most pesticides are not highly selective but are generally toxic to many non-target species, including man and other desirable forms of life that co-inhibit the environment (Murphy, 1980).

Insecticides enter the body through different routs including, inhalation, absorption via the skin, or ingestion of food or contaminated water (Lippman, 1987; Health and Safety Commission, 1988; British Medical Association, 1992 and Health and Safety Executive, 1993).

Safi *et al.*, (1993) stated that, the introduction and heavy use of pesticides, in general, and other toxic substances in the Gaza Strip environment is suspected to correlate with growing incidence of cancer and other abnormalities in the nation. Several death cases were reported

and proved among farmers in the Gaza Strip as a result of use and misuse of pesticides, where precautions during pesticides application regarding wearing protective clothes during application and handling of pesticides, timing of application, frequency and pre-harvesting interval are poorly followed (Abd-Rabou and Al-Agha, 1998). Howevwe, the use of insecticides unfortunately is unavoidable to protect the crops from insects and to increase farmers income, especially in a poor area such as Gaza Strip. More than 250 metric tons of formulated pesticides, mainly insecticides, are used annually in the very densely of populated are in the Gaza Strip, many of them are internationally banned (Safi *et al.*, 1993, and Safi, 1995).

The excessive and irresponsible use of pesticides could result in an apparent leakage of these pesticides into under ground water (US.EPA, 1990), which is the main source of drinking water in the Gaza Strip.

The present study deals with four of the common used insecticides in the Gaza Strip Which are Fenpropathrin, Dimethoate, Thiocyclam and Thionex (Safi *et al.*, 1993 and Abd Rabou and Al-Agha, 1998). However, the degree of toxicity varies with the type of organophosphorus insecticide used (Abd El-Aziz, 1999).

A lthough extensive research has been carried out on the action of different insecticides on the nervous system, litle attention has been paid to their effects on blood parameters. Brown *et al.*, (1990) showed that there was significant association between leukaemia and exposure of farmers to arganophosphorus insecticides but not to fungicides or herbicides. Shakoori *et al.*, (1992) reported that daily oral administration of the insecticide Danitol to rabbits at a dose of 10mg/kg. Body wt. For seven days produced significant decrease in red blood cell count, hemoglobin content and mean corpuscular hemoglobin. In contrast, the white blood cell count was significantly increased. Little attention has been paid to their biochemical effects on non-target organisms. However, the biochemical effects of many pesticides were investigated. Matsumura (1995) noticed that the biochemical systems particularly affected by some pesticides are lipoprotein lipase, glucose transporter proteins, carbohydrate metabolism and insulin secretion. On the other hand Rigon *et al.*, 1994 found that Carbaryl significantly elevated blood glucose levels in treated rats.

The first group (untreated animal) served as control were injected simultaneously with saline only, the second, third, fourth and fifth groups were interaperitonealy injected with 1/10 of the LD_{50} of Fenpropathrin (12mg/kg. B.wt.), Dimethoate (23.5 mg/kg.b.wt.), Thiocyclam (39.9 mg/kg.b.wt.) and Thionex (16 mg/kg.b.wt.) for 5 days respectively.

iii- **Blood Sampling**:

Six rats were taken randomly of each group after 2 days and five days administration. At each sampling date, blood samples were collected from jugular vein as recommended by Shakoori *et al.*, (1992).

The blood samples was divided into two clean dry tubes, the first tube contained dipotassium ethylene diamine tetra-acetate (EDTA) for the hematological tests.

iv- **Hematological parameters**:

Hematological parameters of control group were carried out according to routine clinical methods and instrumental methods of blood analysis (CBC Mashine). No significant differences were found in hematological parameters determined either by routine clinical methods or instrumental methods.

1-Blood cell counts:

The total red blood cell (RBC) and white blood cell (WBC) counts were undertaken as recommended by Dacie and Lewis (1992) using a standard improved Neubauer hamocytometer.

2- Packed cell volume (Hematocrit value):

Hematocrit were determined by allowing the blood to flow into capillary hepartinized tubes then centrifuged in a hematocrit centrifuge at 7400 r.p.m for 5 min.

3- MCV, MCH, MCHC:

According to Seivered (1975), the volume of the average erthrocyte, mean corpuscular volume of the average erthrocyte, mean corpuscular colume (MCV), was calculated from RBCs count and hematocrit following the equation:

Mean corpuscular volume = (hematocrit/Red blood cells count in millions) x 10 fl.

Mean corpuscular hemoglobin (MCH) was calculated from RBCS count and hemoglobin as follows:
MCH = (Hemoglobin content / Red blood ceel count in millions) x 10_{pg}.
While the mean corpuscular hemoglobin concentration (MCHC), the percentage hemoglobin content of the packed cell volume of whole blood, was calculated from hemoglobin and hematocrit as follows:
MCHC = (Hemoglobin content / Hematocrit x 100%.

4- Hemoglobin content:

Blood hemoglobin was determined using the Sigma reagent kits and following their instruction manual hemoglobin was converted into cyanmethaemoglobin was measured colorimetrically where the intensity of the color is proportional to the hemoglobin concentration. Twenty microliters of the blood were added to 5 micromilliliters of diluted Darbkin solution. Standard was prepared by adding 20 microliters of redistilled water to 5 milliliters of redistilled water to 5 milliliters of cyanmethoemoglobin. The colors of the sample and standard were measured, on Perkin-Elmer Lambdal A UV-Vis Spectrophotometer, against Drabkins solution at 540 nm. The second tube was allowed to clot, centfuged at 3000 rpm for 20 min to obtain clear serum and stored in a deep freeze at (-20c) for different biochemical analysis.

v- **Chemical analysis**:

Serum samples were analyzed for glucose, triglycerides and total cholesterol by the methods deseribed by Trendier (1969), Fossati and Prencipe (1982) and Allain (1974), respectively. Non-protein nitrogen constituents were determined by the methods of Mackay and Mackay (1927) for urea, Fossati *et al.*, (1980) for uric acid and Bartels and Bohmer (1972) for creatinine.

The statistical analysis for T-test was performed by using SPSS.

RESULTS AND DISCUSSION

The daily intraperitoneal injection of 1/10 LD_{50} of Fenpropathrin (12mg/kg. Body wt.), Dimethoate (23.5 mg/kg. Body wt.), Thiocyclam (39.9 mg/kg. Body wt.), or Thionex (16 mg/kg. Body wt.) to rats for 5 days did not show any mortality. The effects of short time intraperitoneal

Table (1) Effect of shoet-term interaperitoneal administration of Fenpropathrin insecticide on blood parameters of adult male albino rats

Parameters	Control n=6	Experimental period	
		2 doses n=6	5 doses n=6
WBC count (x 10^6 cell/ul)	6.77± 0.24	11.92±0.36*	13.45±0.86*
RBC count (x 10^6 cell/ul)	6.66±0.42	6.20±0.04*	6.50±0.12
Hb (g/d l)	13.98±0.70	11.97±0.09*	12.98±0.25
Hematocrit (%)	38.77±1.02	34.28±0.51*	37.73±0.76
MCV (fi)	58.21±0.37	55.29±0.70*	58.05±0.71
MCH (pg)	20.99±0.39	19.3±0.06*	19.97±0.15*
MCHC (g/d l)	36.06±0.40	34.92±0.51*	34.40±0.40*
Platelets (x10^3/ul)	676.50±66.37	916.0±101.90*	818.33±90.37
Urea (mg/dl)	26.83±0.79	36.75±0.99*	38.72±2.48*
Uric acid (mg/dl)	1.30±0.07	1.33±0.09*	1.87±0.05*
Creatinine Mg/dl	0.43±0.06	0.57±0.02	0.69±0.04*
Glucose (mg/dl)	128.51±4.38	137.83±3.60*	156.67±1.99*
Cholesterol Mg/dl	74.83±2.24	85.40±1.62*	97.10±3.34*
Triglycerides (mg/dl)	61.50±3.60	83.02±2.48	86.82±3.91

All values expressed as mean ± S.E
* significant differences at $p < 0.05$

Table (2) Effect of shoet-term interaperitoneal administration of Dimethoate on blood parameters of adult male albino rats

Parameters	Control N=6	Experimental period	
		2 doses n=6	5 doses n=6
WBC count (x 10^6 cell/ul)	6.67± 0.24	7.60±0.72	12.38±1.55*
RBC count (x 10^6 cell/ul)	6.66±0.42	7.29±0.25	8.09±15*
Hb (g/d l)	13.98±0.70	14.35±0.24	15.13±0.29
Hematocrit (%)	38.77±1.02	42.63±0.50	48.22±0.73
MCV (fi)	58.21±0.37	58.48±1.05	59.60±0.70
MCH (pg)	20.99±0.39	19.68±0.68	18.70±0.19*
MCHC (g/d l)	36.06±0.40	33.66±0.68	31.38±0.60*
Platelets (x10^3/ul)	676.50±66.37	705.17±28.02	890.33±63.47*
Urea (mg/dl)	26.83±0.79	37.0±1.70	41.13±0.87*
Uric acid (mg/dl)	1.30±0.07	1.38±0.05	1.49±0.09*
Creatinine Mg/dl)	0.43±0.06	0.66±0.07	0.91±0.03*
Glucose (mg/dl)	128.51±4.38	167.87±3.18	107.83±1.99
Cholesterol Mg/dl	74.83±2.24	108.88±2.79	123.07±3.19
Triglycerides (mg/dl)	61.50±3.60	61.68±2.75	68.72±2.18

All values expressed as mean ± S.E
* significant differences at $p < 0.05$

administration of Fenpropathrin, Dimethoate, Thiocyclam and Thionex on hematological and biochemical parameters of male adult rats are summarized in tables (1,2,3 and 4). The results presented in tables 1,2 and 4 showed that interaperitoneal administration of Fenopropathrin, Dimethoate, Thiocyclam and Thionex provoked significant increase in white blood cell (WBC) count compared to the centrol level at the time intervals studied. However, the observed increase in WBC count reaches the maximal value of 2.02, 186, 1.64 and 1.0% times of the control level after five days of Fenpropathrin, Dimethoate, Thiocyclam and Thionex, administration respectively. The dramatic increase in WBC count indicates the activation of defense mechanism and immune system of rats. The induction of WBCs is a positive response for survival due to (Kollar and Roan, 1980). A prominent increase in WBC count has also been recorded following insecticides administration including organophosphates (Ali and Shakoori, 1981; Shakoori *et al.*, 1992). In contrast to WBC count, the red blood cell (RBC) count showed a general decrease upon Fenpropathrin, Thiocyclam, and Thionex insecticides administration all over the experimental periods examined, vice versa the RBC count showed a general increase in Dimethoate insecticides (Tables, 1,2,3 and 4). However, the decrease in RBC count was more pronounced after 5 days of Thiocyclam administration, with a mazimal value of 13.7% of control level (Table 3). The decrease in RBC count may be explained on the basis of inhibitory effect of these insecticides on histogenesis. These results confirm the reported decrease in RBC count after treatment with different insecticides (Shakoori *et al.*, 1984; Shakorri & Ali, 1986).

The present data indicate the clinical toxicological value of Thiocyclam and suggest that Thiocyclam exert a more potent effect on RBC count than Fenpropathrin, and Thionex at a dose of 1/10 LD_{50} in rats.

In general the effect of daily intraperitoneal administration of Fenopropathrin, Thiocyclam and Thionex on hemoglobin (HB) content was parallel to their action on RBC count (Tables 1,3 and 4). However, the Hemoglobin content was increased in rat's blood in response to the daily administration of Dimethoate insecticide (Table 2). A significant decrease in red blood cell count (RBC) and hemoglobin (HB) were demonstrated following daily oral administration of 1/10 LD_{50} of

Tamaron, Parathion or Confidor (Kerrit *et al.*, 1999). Mean corpuscular cell volume (MCH) exhibited a general decrease which was significant at the 2nd and fifth day of Fenpropathrin and Dimethoate administration respectively. However, Thiocyclame and Thionex produced its decrease in MCH after five and two days of administration respectively. (Tables 3 and 4). The decline in HB content and MCH may be attributed to decreased size of RBC or impaired biosynthesis of heme in bone marrow. Abul-Nasr *et al.*, (1994) found that after exposure to Propoxur (Baygon) spray, there was a significant decrease in the total red cell count, while HB concentration showed a non significant decrease, in addition Propoxur (Baygon) insecticides also induced bone marrow toxicity. The insecticides may also have inhibitory effects on delta – aminolevulinic dehydratase which play a major role in heamosynthetic pathways as reported Chiba and Kikuchi (1983).

The present results also showed a general decrease in hematocrit value (packed cell volume, PCV). This decrease was observed at the second and fifth day of Fenpropathrin, Thiocyclam and Thionex, vice versa, Dimethoate caused its significant increase in PCV after 5 days of administration with a value of 24.38% compared to the control level. The decrease observed in PCV is in agreement with that reported by Ali and Shakoori, 1981 and Shakoori and Ali, (1986).

On the other hand, Dimethoate and Thiocyclam caused a general increase in mean corpuscular volume (MCV) at the second and fifth day of treatments, whereas Fenpropathrin and Thionex showed a general decrease in mean corpuscular volume (MCV) (Tables 1,2,3 and 4).

The daily interaperitoneal administration of Fenpropathrin, Dimethoate, Thiocyclam and Thionex caused a general decrease in the mean corpuscular hemoglobin concentration (MCHC) at the second and fifth day of Fenopropathrin, Dimethoate, Thiocyclam administration respectively with values of 4.6%, 13%, and 17.1% compared with the control level.

In general, the blood platelet (PLT) count increased in respoonse to administration of the four insecticides at the different intervals of the experiment, (Tables 1,2,3, and 4). Dimethoate and Thiocyclam gave rise

Table (3): Effect of shoet-term interaperitoneal administration of Thiocyclam on blood parameters of adult male albino rats

Parameters	Control n=6	Experimental period	
		2 doses n=6	5 doses n=6
WBC count (x 10^6 cell/ul)	6.77± 0.24	9.80±0.14*	10.39±0.26*
RBC count (x 10^6 cell/ul)	6.66±0.42	6.32±0.09	5.75±0.25*
Hb (g/d l)	13.98±0.70	12.78±0.21	11.12±0.17*
Hematocrit (%)	38.77±1.02	37.10±0.75	37.22±1.12
MCV (fi)	58.21±0.37	58.70±0.52	64.73±0.91*
MCH (pg)	20.99±0.39	20.22±0.29	19.34±0.15*
MCHC (g/d l)	36.06±0.40	34.45±0.38*	29.88±1.17*
Platelets (x10^3/ul)	676.50±66.37	681.33±16.40	880.17±24.44*
Urea (mg/dl)	26.83±0.79	27.02±0.73	28.18±1.02
Uric acid (mg/dl)	1.30±0.07	1.61±0.03	1.68±0.27*
Creatinine Mg/dl)	0.43±0.06	0.44±0.02	0.49±0.04
Glucose (mg/dl)	128.51±4.38	184.67±5.95*	111.17±4.21*
Cholesterol Mg/dl	74.83±2.24	75.95±0.97	87.93±2.18*
Triglycerides (mg/dl)	61.50±3.60	63.02±1.03	76.5±0.76*

All values expressed as mean ± S.E
* significant differences at $p < 0.05$

Table (4) Effect of shoet-term interaperitoneal administration of Thionex on blood parameters of adult male albino rats

Parameters	Control N=6	Experimental period	
		2 doses n=6	5 doses n=6
WBC count (x 10^6 cell/ul)	6.77± 0.24	7.83±0.51*	7.27±0.48
RBC count (x 10^6 cell/ul)	6.66±0.42	6.0±0.46	6.15±0.07
Hb (g/d l)	13 98±0.70	11.80±0.24*	12.27±0.35*
Hematocrit (%)	38.77±1.02	35.23±2.47	35.07±1.01*
MCV (fi)	58.21±0.37	55.38±0.24*	57.02±2.09
MCH (pg)	20.99±0.39	19.67±1.74	19.95±0.81
MCHC (g/d l)	36.06±0.40	35.5±3.24	34.99±0.97
Platelets (x10^3/ul)	676.50±66.37	788.33±51.60	724.83±52.35
Urea (mg/dl)	26.83±0.79	39.33±4.96*	49.82±3.25*
Uric acid (mg/dl)	1.30±0.07	1.41±0.11	2.49±0.97*
Creatinine Mg/dl)	0.43±0.06	0.62±0.05*	0.95±0.09*
Glucose (mg/dl)	128.51±4.38	147.33±9.045*	120.33±5.18*
Cholesterol Mg/dl	74.83±2.24	103.52±11.19*	121.97±3.04*
Triglycerides (mg/dl)	61.50±3.60	75.62±3.98*	67.17±5.30

All values expressed as mean ± S.E
* significant differences at $p < 0.05$

to their maximal effect after 5 days of intraperitioneal administration with values 31.6% and 30.1% respectively, compared to the control level. Fenpropathrin and Thionex cased its maximal increase at the second day with values of 35.4%, 16.5% compared with the control level.

The daily intraperitoneal injection of 1/10 LD50 of Fenpropathrin, Dimethoate, Thiocyclam and Thionex, respectively caused a general increase in urea concentration in the blood serum of treated rats compared with the control level. In general insecticides raised up the concentration of urea in rat's blood serum at second day of treatment. Urea is the principal end product of protein catabolism. Enhanced protein catabolism and accelerated amino acid deamination for gluconeogensis is probably an acceptable postulate to interpret the elevated levels of urea. The presence of some toxic compounds might increase blood urea and decrease plasma protein (Varely, 1976, Yassin 1999 and Ashour, 1999). In addition, an increase in urea concentration suggested that animals experienced hemoconcentration due to a mile dehydration (Guilhermino *et al.*, 1998).

In general, uric acid concentration in the serum of treated rats increased in response to the daily intraperitoneal injection of Fenpropathrin,Dimethoate, Thiocyclam and Thionex(Tables 1,2,3, and 4). The highest serum concentration of uric acid was observed in the fifth day of the treatment by Fenpropathrin, Dimethoate, Thiocylam and Thionex, whereas uric acid concentration in rats blood serum treated by Fenpropathrin,Dimethoate,Thiocyclam and Thionex were 1.44,1.15, 1.29, and 1.92 times greater, respectively, than the control level. Uric acid is the end product of the catabolism of tissue nucleic acid, i.e. Purine and pyrimidine hases metabolism (Wolf *et al.*, 1972). In the present work the serum uric acid levels exhibted increment in the treated rats for five days. This may be due to degradation of purines and pyrimidines or to an increase of uric acid level by either overproduction or inability of excretion (Wolf *et al.*, 1972).

In general, creatinine concentration in rat's blood serum increased in response to the daily intraperitoneal injection of Fenpropathrin, Dimethoate, Thiocyclam and Thionex (Tables, 1,2,3 and 4).

The highest serum concentration of creatinine was observed in the fifth day of the treatments by Fenpropathrin, Dimethoate, Thiocyclam and Thionex were 1.16, 2.12, 1.14 and 2.21 times greater, respectively, than the control level. These findings are contradict with that reported Gluilhermino et al., (1998) for Parathion administration to rats.

In general, glucose content in rat's blood serum responded differently to the treatments by the tested insecticides(Tables 1,2,3 and 4). Fenpropathrin, Dimethoate, Thiocyclam and Thionex caused a significant increase in glucose content of rat's blood serum at the second day of treatment. However, at the fifth day of treatment with 1/10 LD_{50} of insecticide, Dimethoate, Thiocyclam and Thionex, glucose content were 1.19, 1.16 and 1.07 times lower than the control level respectively. Vise versa, the glucose content in rat's blood serum was 1.22 times greater than the control level in response to the daily administration of Fenpropathrin insecticide (Table 1). Insecticides may directly or indirectly play a specific role in pancreatic secretion (Matsumura, 1995), gluconeogensis process and glycogen metabolism or glucose oxidation. It means that there was a disturbance in carbohydrate metabolism of rat's by the daily intraperitoneal administration of insecticides.

Intraperitoneal injection of 1/10 LD_{50} of Fenpropathrin, Dimethoate, Thiocyclam and Thionex for 2 days caused a general increase in chlolesterol concentration in blood serum of treated rat's compared to the control level at the two intervals of the treatments (Tables1,2,3 and 4). However Fenpropathrin, Dimethoate, and Thionex, showed a significant increase in serum cholesterol content at th 2^{nd} and fifth day of administration whereas Thiocyclam produced significant increase in serum cholesterol content at the fifth day of administration. The increment in cholesterol content agreed with that reported by Parker *et al.*, (1984) in response to six month feeding of Fenvalerate in dogs. The elevation in cholesterol content also coincides with that noticed by Yassin (1999) for Tamaron, Parathion or Confidor administration on rabbit's blood serum.

Intraperitoneal administration of 1/10 LD_{50} of Fenpropathrin, Dimethoate, Thiocyclam or Thionex, for 2 days raised up triglycerides content of rat's blood serum at the two intervals of the experiment (Table, 1,2,3 and 4) Triglycerides contents of rat's blood serum, treated

with Fenpropathrin and Dimethoate for 2 and five days were 1.35, 1.41 and 1.0, 1.12 times greater than the control level respectively. However, in those treated with Thiocylam and Thionex for the same intervals, triglycerides contents were 1.03, 1.25, 1.23 and 1.09 time greater than the control level respectively. The changes observed in serum triglycerides and cholesterol contents, in response to the treatment by any of the tested insecticides, take place in the liver due to imbalance between the normal rates of lipid synthesis, utilization and secretion (Glasser and Mager, 1972). Finally, from the previous results one can easily conclude that Fenpropathrin, Dimethoate, Thiocyclam and Thionex, administration induce significant alteration in hematological and some biochemical parameters of rat's blood. This reflects the harmful effects of these insecticides on blood, liver, and Kidney structures and functions.

Therefore, implementation of primary prevention programs in the Gaza Strip in urgently needed.Such programs would include plans for health, education, training courses for farmers to improve their safety and ecological awarness, regulations for the use of protective clothes and monitoring of the health status of workers exposed to insecticides and finally monitoring of ground water contamination by insecticides and for adoption of integrated pest management (IPM) program to reduce pesticide dependence.

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الملخص العربى

دراسة مقارنة للتأثير السام الناتج عن حقن بعض المبيدات الحشريه لفترة قصيرة على قياسات الدم وبعض القياسات البيوكيميائيه فى دم الفأر الابيض البالغ

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تهدف هذه الدراسه الى تقدير ومقارنه التأثير السام الناتج عن حقن ذكور الفئران البيضاء البالغه في تجويف البطن (قيمة الجرعة ١٠/١ من LD_{50}/كجم من وزن الجسم يوميا) من بعض المبيدات الحشريه مثل Fenpropathrin, Dimethoate, Thiocyclam and Thionex على قياسات الدم وبعض القياسات البيوكيميائيه، وقد أدى حقن كل مبيد من المبيدات الاربعه لمدة خمسه ايام متتاليه الى تغيرات مختلفه فى قياسات الدم مثل زيادة ملموسه فى عدد كرات الدم البيضاء حيث وصلت اعلى قيمة لها الى 101.7% , 85.6% , 63.9% , 9% على الترتيب مقارنة بحيوانات المجموعه الضابطة.

كذلك ادى اعطاء المبيدات Fenpropathrin, Thiocyclam, Thionex الى نقص فى عدد كرات الدم الحمراء بينما ادى اعطاء مبيد Dimethoate الى زيادة ملموسه فى عدد كرات الدم الحمراء بعد يومين وخمسة ايام من زمن التجربه. وبالنسبه للهيموجلوبين فقد انخفض نتيجة اعطاء مبيدات Fenpropathrin, Thiocyclam, Thionex أما نسبة الهيماتوكريت فقد انخفضت بصفه عامة نتيجه اعطاء المبيدات السابقه ما عدا مبيد Dimethoate، كذلك ازداد معدل MCV بصفه عامة بعد اعطاء مبيدى Dimethoate, Thiocyclam ، بينما نقص معدل MCV بعد اعطاء مبيدى Fenpropathrin, Thionex وذلك بعد يومين وخمسة ايام من الحقن، اما نسبة NCH فقد انخفضت نتيجة اعطاء المبيدات الاربعه.

ومن ناحية اخرى فان MCHC قد انخفض بصفه عامة وذلك بعد اعطاء المبيدات الاربعة، أما بالنسبه للصفائح الدموية فقد ارتفعت بصفه عامة نتيجة اعطاء المبيدات الاربعه. كذلك ادى حقن المبيدات الاربعه فى الفئران الى زيادة فى تركيز اليوريا وحمض البوليك والكرياتنين فى سيرم دم الفأر مقارنة بحيوانات المجموعة الضابطة، أما بالنسبة لمحتوى الجلوكوز فى سيرم الدم فقد اختلفت فى الاستجابه نتيجه اعطاء المبيدات السابقه،

كذلك تشير النتائج الى حدوث زيادة فى محتوى الكولستيرول والجلسريدات الثلاثيـــة اثنـــاء فترة التجربه.

مما سبق يمكن ان نستنتج ان اعطاء المبيدات الحشـــرية لمـــدة زمنيـــه قصـــيره وبجرعات صغيرة تحدث تأثيرات ضارة على قياسات الدم والكلى والكبد.