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Effect of Fenvalerate on some physiological, biochemical and hormonal blood criteria in Male Rats.

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ABSTRACT

In this study (120) adult male rats were used. The animals were divided into four groups, three of these groups were the experiment groups that treated with different doses of the fenvalerate (10.125, 21.25, and 42.5 mg / kg) of rats for three time periods were 10 days and 20 day and 30 days and the last group was the control group that gave distilled water. The criteria that have been studied: blood parameter such as the number of the RBCs and WBCs count, the level of hemoglobin, the packed cells volume (hematocrit) and platelet counts. and biochemical parameter which included glucose ,cholesterol , albumin and liver function test ALT and AST and FSH , LH and testosterone hormones and sperm parameter such as the total sperm count and sperm abnormality .The results from hematological parameter indicated significant decrease in all hematological parameter except WBCs count and biochemical parameter showed significant increase in liver function test ALT and AST, glucose , cholesterol and cearatinin and significant decrease in albumin , follicle-stimulating hormone(FSH) , luteinizing hormone(LH) and Testosterone hormone . Significant decrease in the total sperm count and live sperm.

Keywords: Fenvalerate, Biochemical and hormonal criteria , Rats.

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INTRODUCTION

Fenvalerate is a pyrethroid insecticide extensively used in agricultural crops such as rice, wheat, sorghum, pulses, groundnut, vegetables and on cotton to kill the stem borers, leaf folders, fruit borers and head borers.[1]Commonly used in agriculture and other domestic applications due to its high insecticidal activity and low mammalian, avian and phytotoxicities .[2] Frequent and continuous use of pesticides has resulted in the distribution on a large scale in the environment , these toxic pesticides not only to insects and pests, but at different levels for the animals and man[3]. In domestic animals and humans, simultaneous exposure to fenvalerate and nitrate can lead to various health afflictions and tissue and organ damage which can be assessed by measuring levels of various biochemical enzymes and other parameters indicative of specific organ damage[4]. Fenvalerate also effect on many enzyme such as transaminase enzyme, fenvalerate induced significant increase in ALT, AST and phosphatase enzyme while decrease in Cholinesterase and Lipase[5].Fenvalerate also effect on immunity that display immune suppressive effects on humeral and cell mediated immune response in adult mice, rats, rabbits and goats [6].Fenvalerate insecticide of moderate toxicity , in laboratory animals, it was noted the central nervous system poisoning after acute exposure or short-term.[7]

Aim of Study:

The present study was designed to investigate any histological , hematological , and physiological changes caused by oral toxicity of fenvalerte in male rats and measure physiological parameter such as (WBCs count, RBCs count, Hbs, PCV, and platelet count).Measure biochemical parameter such as level of liver function tests (AST , ALT), total cholesterol , total albumin, Creatinine, total glucose. Measure follicle stimulating hormones, luteinizing hormones and testosterone.

MATERIALS AND METHODS

Adult male(*Ratus ratus*) rats which were used in the study were conducted at the animal house of the faculty of Veterinary Medicine and Department of Biology- Faculty of Science/ University of Kufa-Iraq. The study began for the period of 2014/12/1 to 2015/6/1 using the 120 laboratory rat. The weight of rats ranged between 250-495g and age of them were12-14 weeks. The animals were kept in an air-conditioned room in individual stainless steel cages at 22-25C° on a 12-hr light–dark cycle. The animals were received standard pellets feed and Sterile mineral water throughout the experiment. None of the rat had any clinically evident infection**.** Preparation of fenvalerate doses were10.125, 21.25 and 42.5mg/kg of body weight. Experimental design of The study protocol was approved by the ethical committee of the Department of Biology-Faculty of Science-Kufa University .The overall number of animals used was 120. They were randomly divided in to four groups. Experimental groups were consisted for each concentration is 30 rats. All rats except normal control were given orally with fenvalerate, control group was given distilled water. The treated animals were subdivided into three groups according to the concentration of fenvalerate and time of dosage. Three oral concentrations of fenvalerate (10.125, 21.25, 42.5mg/kg/day).The concentrations of fenvalerate orally were given by syringe ,and were continued for 10, 20, 30 days and were calculated according to the animal's body weight.

At the end of the experimental period (one month),and after overnight fasting, all rat were weighed, and anesthetized using a mixture of ketamine and xylazinei (20 mg/kg ketamine ;10mg/kg xylazinei), and then they were sacrificed[8].The blood sample was obtained from animal through heart puncture by using a 5ml disposable syringe for biochemical tests. The blood was placed in tubes without anticoagulant and centrifuged at 3000 rpm for 10 minutes. The blood serum was separated and kept at in refrigerator at -20C° until the time of analysis[9].Sensitive balance from Shimadzu- Japan used the weight of reproductive organs .It has measurable physiological blood criteria by The measurement of the erythrocytes, hemoglobin, hematocrit, and leukocytes was made in an automatically counter (Hematology analyzer) and criteria of hormonal blood(FSH, LH, and Testosterone)by ELISA method, according to the procedures provided by the manufacturer's instructions (Accu-Bind, USA). When Biochemical blood criteria: glucose, cholesterol, albumin, ALT, AST , and creatinine were measured in serum blood by spectrophotometer method and kits(Biomeghreb, BiolaboSA, France, Syrboio and Belgium Companies respectively). The sperm concentration epididymis tail was counted according to method of Seed etal[10], using the light optical microscope.

The percentage of live was measured in the glass slide smear prepared from the suspension of epididymal tail content by using eosin-nigrosin stain diluted with 3% sodium citrate. For each sample, at least 10 microscopic fields and 500 sperms from different fields were observed at 400X magnification under light microscope,in order to calculate the percentage of viability[11].In this technique, the head of live sperm was not stained with pigment, whilethe head of dead sperm cell seemed to be pink[12]. The counting was performed by the following equations:

Sperm viability percentage = number of live sperms / total number of sperms x 100

The spermatogenic cells, namely spermatogonia, primary and secondary sperm- atocytes, and spermatids were counted according to Alwachi et.al[13].

Statistical analysis was done by using GraphPad Prism version5 which were used one- way analysis of variance(Tukey: compare all pairs of columns). Columns statistical were including Mean , Std. Deviation (SD) , Std. Error (SE) and SetPvalue≤0.05assignificant.

RESULTS

Results Table 1 showed significant differences between the treatment groups and animal pesticide and the control group at all affect blood biochemical criteria studied.Where it was a significant increase evident in each of the ALT, AST, and creatinine andcholesterol especially in the longest days of the dosing period (30 days) while the moral decline in albumin only between the treatment groups and the control group often.Table 2 also showed significant differences in all physiological blood criteria studied, but the WBCs were significantly increased and clear in the treatment of animals compared with the control group.Fenvalorate impact on the weight of the genitals (testis and epididymis) and the number of sperm concentration as well as the percentage of dead sperm cells and spermatogenesis's cells in Table 3 effect was clear in all these standards when compared with the control group.Table 4 shows the effect of one of the hormones in the pesticide-treated animals when compared with the control group.

DISCUSSION

Biochemical blood criterion

AST & ALT

The results in table 1 showed significant increase ($P < 0.05$) in both (AST and ALT) in all groups of rats this result is in agreement with other studies that showed administration of fenvalerate to rats resulted in many histopathological alterations in the liver and increase in liver function enzymes, ALT and AST fenvalerate caused degenerative changes in the liver, haemorrhage, mild fatty changes, infiltration of mono nuclear cells and proliferation of bile duct[14] . Glutamate oxaloacetate transaminase (AST) is mostly released at time of liver or muscles cell injured the increase of AST level with increased exposure time is due to sugar mill effluent that increases rate of proteolysis Glutamate pyruvate transaminase (ALT) also shows on increase which is due to tissue damage or increase synthesis of aminotransferases by cypermethrin pesticide [15]. Another study shows significant increase in the level of AST ALT activities under sublethal effect of many pestiside[16].The transaminases of AST and ALT (entering the blood after the cell necrosis of certain organs) can be used to indicate the tissue damage of the liver alterations in the activity of alanine and aspartate transaminase enzymes will be reflected on the energy yielding TCA cycle and nitrogen metabolism they also influence the gluconeogenic process and any change in the transaminase activity can be correlated with the protein and carbohydrate metabolism and thereby help in analyzing the metabolic shifts [17]. Fenvalerate altered antioxidant enzyme activities such as AST and ALT these elevated enzymatic activities induced by oxidative stress [7].

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Table 1: Effect of fenvalerate on biochemical blood parameters in treatments groups comparison with control groups in rats

Groups		Control group N= 30	10 Days						20 Days						30 Days					
Criteria			42.5mg/kg N=10		21.25mg/kg N=10		10.125mg/kg N=10		42.5mg/kg N=10		21.25 mg/kg N=10		10.125mg/kg N=10		42.5mg/kg N=10		21.25 mg/kg N=10		10.125mg/kg N=10	
AST (IU/L)	Mean	70.00	81.00	a	90.00	ab	85.00	abc	92.0	abd	89.0	abd	91.00	abd	83.0	acefg	93.0	abdfh	99.0	abcdefghi
	SD	2.160	1.886		2.404		2.789		1.491		1.563		1.826		2.357		2.357		1.333	
	SE	0.683	0.596		0.760		0.881		0.471		0.494		0.577		0.745		0.745		0.421	
ALT (IU/L)	Mean	24.20	36.00	a	35.00	a	37.00	a	37.0	a	38.0	a	39.00	ac	52.0	abcdefg	42.0	abcdefh	44.0	abcdefgh
	SD	2.348	2.055		2.708		2.357		1.563		1.633		1.155		2.055		2.108		2.160	
	SE	0.742	0.649		0.856		0.745		0.494		0.516		0.365		0.649		0.666		0.683	
Albumin (mg/dl)	Mean	4.300	1.200	a	1.200	a	1.400	a	1.30	a	1.20	a	1.200	a	1.10	a	1.00	ab	1.20	a
	SD	0.245	0.188		0.188		0.216		0.323		0.188		0.188		0.141		0.258		0.19	
	SE	0.077	0.059		0.059		0.068		0.102		0.059		0.059		0.044		0.081		0.06	
Creatinin (mg/dl)	Mean	0.50	0.70		1.20	ab	1.40	ab	1.40	ab	1.43	ab	1.59	abc	1.10	abdefg	1.50	abch	1.90	abcdefghi
	SD	0.163	0.13		0.18		0.163		0.21		0.019		0.26		0.14		0.23		0.22	
	SE	0.051	0.042		0.059		0.051		0.068		0.006		0.083		0.045		0.071		0.068	
Cholesterol (mg/dl)	Mean	106.0	212.0	a	197.0	ab	196.0	ab	197.0	ab	199.0	ab	205.0	abc def	199.0	abg	198.0	abg	206.0	abcdefhi
	SD	3.559	6.412		1.886		2.494		1.886		2.211		4.320		2.211		1.886		2.211	
	SE	1.125	2.028		0.596		0.788		0.596		0.699		1.366		0.699		0.596		0.699	
Glucose (mg/dl)	mean	88.30	81.33		170.0	a	140.0	ab	103.0	abc	150.0	abd	151.0	ad	111.0	abcef	133.0	abdg	165.0	acdgh
	SD	3.129	42.31		5.375		6.272		3.197		5.375		2.211		5.312		2.789		3.197	
	SE	0.989	13.38		1.700		1.983		1.011		1.700		0.699		1.680		0.881		1.011	

Different latters are meaning significant difference ($p < 0.05$)

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Table 2: Effect of fenvalerate on physiological blood parameters in treatments groups comparison with control groups in rats

Groups		Control group	10 Days						20 Days						30 Days					
Criteria		N= 30	42.5mg/kg N=10		21.25mg/kg N=10		10.125mg/kg N=10		42.5mg/kg N=10		21.25 mg/kg N=10		10.125mg/kg N=10		42.5mg/kg N=10		21.25 mg/kg N=10		10.125mg/kg N=10	
Hb (g/dl)	Mean	12.94	10.50	a	10.18	a	9.210	abc	10.4	ad	8.92	abce	8.48	abcdef	9.96	abdfg	9.62	abcefg	7.39	abcdefghi
	SD	0.56	0.29		0.13		0.24		0.51		0.02		0.04		0.02		0.03		0.18	
	SE	0.178	0.093		0.040		0.075		0.16		0.007		0.012		0.007		0.009		0.06	
PCV %	Mean	45.70	38.40	a	39.90	a	37.10	a	33.8	abcd	36.2	ac	32.70	abcdf	32.6	abcdf	32.2	abcdf	30.5	abcdef
	SD	2.003	1.506		2.079		1.663		2.74		2.20		2.163		2.32		2.39		0.71	
	SE	0.633	0.476		0.657		0.526		0.87		0.69		0.684		0.73		0.76		0.22	
RBC (x 10^6 cell/ml)	Mean	6.858	5.575	a	5.440	a	4.117	abc	5.14	ad	5.17	ad	4.154	abcde	5.24	adf	5.321	adf	3.89	abcdegh
	SD	0.431	0.298		0.141		0.129		0.18		0.11		0.206		0.27		0.412		0.48	
	SE	0.136	0.094		0.045		0.041		0.06		0.04		0.065		0.08		0.130		0.15	
WBC (x 10^5 cell/ml)	Mean	6.780	12.24	a	12.98	a	14.09	a	14.6	ab	14.4	a	13.98	a	14.1	a	13.44	a	15.6	abc
	SD	0.0943	1.614		0.724		0.844		2.81		1.61		1.908		2.34		0.860		1.69	
	SE	0.0298	0.510		0.229		0.267		0.89		0.51		0.604		0.74		0.272		0.53	
Platelet X10^3cell/ml	**Mean**	448.2	425.1		425.1		429.5		397.2	abcd	368.2	abcde	317.4	abcdef	273.7	abcdefg	247.4	abcdefg	218.1	abcdefghi
	SD	5.371	15.87		8.252		16.81		14.94		29.12		22.27		22.34		29.33		19.42	
	SE	1.698	5.019		2.610		5.315		4.725		9.208		7.043		7.063		9.276		6.140	

Different latters are meaning significant difference ($p < 0.05$)

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Table 4: fenvalerate impact on the weight of reproductive organs, the number of sperm concentration , percentage of dead sperm and spermatogenesis`s cells.

Groups		Control group	10 Days						20 Days						30 Days					
Criteria		N= 30	42.5mg/kg N=10		21.25mg/kg N=10		10.125mg/kg N=10		42.5mg/kg N=10		21.25 mg/kg N=10		10.125mg/kg N=10		42.5mg/kg N=10		21.25 mg/kg N=10		10.125mg/kg N=10	
Testis Weight (mg)	Mean	828.7	580.2	a	489.5	ab	501.2	ab	561.8	a	531.8	a	430.2	abfg	520.8	ah	405.3	abcefgi	278.3	abcefghi
	SD	54.72	17.64		17.80		1.135		9.807		96.4		13.14		4.392		88.49		57.06	
	SE	17.30	5.577		5.630		0.359		3.101		30.5		4.155		1.389		27.98		18.04	
Epididymis Weight (mg)	Mean	350.3	204.8	a	121.9	ab	53.50	abc	190.3	abcd	67.70	abc de	47.40	abcef	191.2	abcdfg	81.80	abcdefgh	35.00	abcdefghi
	SD	6.273	9.682		1.663		2.369		4.001		1.160		1.506		1.751		1.687		2.789	
	SE	1.984	3.062		0.526		0.749		1.265		0.367		0.476		0.554		0.533		0.882	
Sperms conc. (10^5cell/ml	Mean	52.20	47.10	a	34.50	ab	25.00	abc	45.40	acd	31.50	abd e	18.40	abcd ef	33.50	abdeg	20.50	abcdefh	18.80	abcdefh
	SD	1.932	2.331		2.369		2.404		2.716		1.716		2.066		3.375		2.635		4.050	
	SE	0.6110	0.737		0.749		0.760		0.859		0.543		0.653		1.067		0.833		1.281	
Sperms Dead %	Mean	18.50	63.20	a	74.40	ab	82.00	ab	60.10	acd	73.20	ae	79.00	abe	71.50	ade	81.50	abe	82.90	abef
	SD	4.197	2.486		3.204		1.414		4.202		2.530		3.162		5.442		3.598		2.601	
	SE	1.327	0.786		1.013		0.447		1.329		0.800		1.000		1.721		1.138		0.823	
Spermatogonia %	Mean	61.10	44.80	a	41.10	a	40.20	ab	42.60	a	53.70	abc de	41.50	a	43.70	af	41.30	af	25.20	abcdefghi
	SD	0.994	2.658		0.738		4.780		1.713		3.653		2.550		3.268		1.494		2.098	
	SE	0.315	0.841		0.233		1.511		0.542		1.155		0.806		1.033		0.473		0.663	
Spermatocytes %	Mean	57.60	41.20	a	31.10	ab	30.20	ab	37.40	abcd	43.00	acd e	18.50	abcd ef	40.70	acdg	36.60	abcdfgh	11.40	abcdefghi
	SD	2.951	1.135		1.853		2.486		3.307		1.700		0.85		1.252		2.547		2.675	
	SE	0.933	0.359		0.586		0.786		1.046		0.538		0.269		0.396		0.806		0.846	
Spermatids %	Mean	55.60	40.80	a	25.40	ab	16.10	abc	34.70	abcd e	40.00	acd ef	4.900	abcd ef	40.00	acdeg	32.30	abcdefgh	1.900	abcdehi
	SD	2.797	0.789		1.838		2.132		2.163		6.799		2.378		6.749		1.947		1.197	
	SE	0.884	0.249		0.581		0.674		0.684		2.150		0.752		2.134		0.616		0.379	
Spermatozoa %	Mean	53.80	37.00	a	23.90	ab	17.00	abc	34.40	acd	37.10	acd	3.400	abcd ef	27.30	abdefg	22.50	abdefgh	1.400	abcdefhi
	SD	2.300	1.944		2.234		1.333		1.955		1.449		1.430		4.644		6.996		0.6992	
	SE	0.727	0.615		0.706		0.422		0.618		0.458		0.452		1.469		2.212		0.2211	

Different latters are meaning significant difference ($p < 0.05$)

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Table 3: Effect of Fenvalorate on some hormonal blood parameters in treatments groups comparison with control groups in rats

Groups		Control group N= 30	10 Days						20 Days						30 Days					
Criteria			42.5mg/kg N=10		21.25mg/kg N=10		10.125mg/kg N=10		42.5mg/kg N=10		21.25 mg/kg N=10		10.125mg/kg N=10		42.5mg/kg N=10		21.25 mg/kg N=10		10.125mg/kg N=10	
FSH (IU/L)	Mean	6.350	0.369	a	0.338	a	0.361	a	0.291	a	0.37	a	0.33	a	0.34	a	0.28	a	0.1400	a
	SD	1.283	0.012		0.021		0.023		0.015		0.03		0.073		0.043		0.06		0.041	
	SE	0.428	0.004		0.007		0.008		0.005		0.01		0.024		0.014		0.02		0.014	
LH (IU/L)	Mean	4.960	0.841	a	0.639	a	0.44	a	0.44	a	0.43	a	0.442	a	0.544	a	0.460	a	0.207	ab
	SD	0.189	1.167		0.140		0.025		0.025		0.02		0.035		0.075		0.035		0.0323	
	SE	0.06	0.369		0.044		0.008		0.008		0.007		0.011		0.024		0.011		0.0102	
Testosterone (IU/L)	Mean	4.500	0.560	a	0.735	a	0.763	a	0.529	a	1.002	a	0.622	a	0.541	a	0.654	a	0.4810	a
	SD	0.245	0.025		0.019		0.047		0.022		1.475		0.036		0.029		0.026		0.0378	
	SE	0.078	0.008		0.006		0.015		0.007		0.467		0.011		0.009		0.008		0.0119	

Different latters are meaning significant difference ($p < 0.05$)

Creatinine

The result in Table 1 indicated significant increase ($P < 0.05$) in creatinine levels in all groups of rats this result agrees with another study indicated creatinine level increase may be duo to evaluating renal functions particularly the glomeruli since creatinine is excreted in the urine after filtration[18] .

In another study not only fenvalerate effects on creatinine but also other pesticide such as diazon these results indicated that diazinon metabolites caused toxicity in renal system; and the immune system makes a good role for defending against foreign particles the effect of diazinon on kidney was studied in different animals oral administration of diazinon on male albino rats showed degeneration of the renal tubules and that exposing mice to diazinon caused degeneration of renal tubules, atrophy of glomeruli and interstitial inflammatory cells infiltrations[19] . Another study indicated the increase of creatinine because pestiside induced oxidative stress oxidative stress involves the alteration of many events in the cell by a variety of processes it may be change the permeability of mitochondrial membrane which is extremely harmful for the cell[20] . Increased serum creatinine levels reflect the diagnosis of renal failure[21]. The present results showed that delta methrin caused significant increase in serum urea and creatinine this indicates diminished ability of the kidneys to filter these waste products from the blood [22]. Elevated of creatinine may be due to necrosis to renal tubules with nuclear and chromatin change in the epithelial of cortical tubules [23]. Creatinine is more specific to kidney, since kidney damage is the only significant factor that increases serum creatinine level[24] . Fenvalerate in large doses significantly altered creatinine indicating kidney dysfunction [25]. Other studyshowed serum creatinine levels was significantly increased ,which could be attributed to the free radical induced oxidative damage by delta methrin on kidney serum levels of creatinine was used as indicator of renal function and [26] .

Albumin

The result shown in table 1 indicated a significant decrease in albumin level in all groups of rats. This results is in agreement with another study indicated reduction in serum protein, particularly albumin, in fenvalerate treated group could be due to changes in protein and free amino acid metabolism and their synthesis in the liver also, the protein depression may be due to the loss of protein either by reduction in protein synthesis or increase in proteolytic activity or degradation [27]. Albumin concentration decrease in rats and mice that are exposed to the pyrethroid fenvalerate [28] . Another study showed increase in albumin levels as a result of pesticide administration such an increase in serum enzymatic activities could be the end of degenerative changes in hepatic cells [29]. Cypermithrin also affects albumin, admistrition of cypermithrin which leads to the decrease of albumin [30].

Cholesterol

The result in table 1 indicated significant increase($P \leq 0.05$) in all groups of rats Our result agrees with another study that shows an increase of cholesterol levels that was treated with lead acetate in same indicated that vitamin C supplementation has protective role, and leads to the decrease of the elevated levels of cholesterol [31].Another study also shows an increase in cholesterol level which may be due to the occurrence of these echinocytes with disrupted overlying plasma membrane, conversion of erythrocytes into echinocytes which may be attributed to the increase of cholesterol level caused by liver dysfunction it has been illustrated that change in membrane lipid composition could be the key reason for such deformities in shape of blood cells in response to various chemical treatments alteration in forms of blood cell could be illustrated as induced stress caused by toxicant such as reported by workers act with chloropyrifos[32] . Another study is against this result, in this study cholesterol content that depleted in early phase of intoxication indicates inhibition of cholesterol synthesis due to non-availability of acetoacetate units because acetyle CoA may be involved in gluconeogenesis producing glucose to fulfill the energy requirement under pesticide stress[33] . Serum cholesterol showed an increasing trend for all cypermithrin doses the maximum difference was in the case of sub chronic exposures [34].

Glucose

The result shown in table 1 indicated significant increase($P \leq 0.05$) in all groups of rats This study is in agreement with other study which indicated significant increase in glucose may be due to chronic exposure to

fenvalerate induced an increase in liver AA level, but a decrease in kidney AA level in a mammalian system (rat) the plasma AA level increases rapidly due to stress ascorbic acid is involved in intermediary metabolism. Its dietary inclusion increases the activity of various enzymes like, glucose [35]. Chemical-induced cellular alteration varies from simple increase of metabolism to death of cell the increase or decrease of enzyme activity is related to the intensity of cellular damage therefore, increase of transaminase activity along with the decrease of activity of free radical scavengers is the consequence of α-CP induced pathological changes of liver the severe hyperglycemia may due to the effect of increase in catecholamine's level, which causes glycogenolysis, and this may be a reason for the significant decrease in liver glycogen [36]. Blood glucose level significantly increased and liver glycogen significantly decreased [37].

Physiological blood criterion

Hb

The result obtained from table 2 indicated significant decrease in Hb level in all groups of rats. this result is in agreement with another study that indicated a decrease in Hb because chemical materials developed a reduction in hemoglobin this observation is consistent with the anemia and indicates that large amounts of manganese can interfere with intestinal iron absorption. This study also indicated reduction of hemoglobin [38]. A decrease in hemoglobin concentration may be due to increased rate of destruction or reduction in rate of formation of RBC. In addition, reduction in the blood parameters (RBC count, Hb concentration, PCV %) may be attributed to hyperactivity of bone marrow leading to the production of RBC with impaired integrity that easily destructed in the circulation [39]. Synthesis of hemoglobin (Hb) begins in the polychromic normoblast stage the synthesis of Hb requires iron, which is generally obtained from stored ferritin and from dietary sources the reduction in general food intake by intoxicated albino rats and no supplementary supply of extra iron might be the reasons for the iron deficiency fall in the rate of hemoglobin synthesis during all the stages of maturation of erythrocytes has also been reported, when the supply of iron is inadequate [40]. Perhaps impair oxygen supply to various tissues results in a slow metabolic rate and low energy production the significant decrease in the Hb concentration may also be due to either an increase in the rate at which the Hb is destroyed or to a decrease in the rate of Hb synthesis[41].

PCV

The result obtained from Table 2 indicated a significant decrease of PCV in all groups of rats . This result is in agreement with another study that indicated decrease in PCV values, indicating the occurrence of anemia associated with erythropenia drop in PCV could be attributed to low RBC count or haemodilution[42]. Another study indicated the decrease of PCV due to an increased rate of breakdown of red cells and/or the toxic effect of pesticides on bone marrow decrease in RBC also indicates anemia, while reduced number of RBC, Hb and PCV may also be a consequence of severe hemorrhage which results in dilution of blood[43]. In the other study researchers found significant decrease was observed in the level of PCV and TLC in the treated animals the lower values of Hb and PCV observed in CPF(Chlorpyrifos) treated animals indicate that the repeated exposure to CPF causes anemia the reason for anemia in the CPF treated groups is not known it may however be related to disruption of erythropoiesis or an increase in RBC destruction [44].The male mice was treated with deltamethrin, was found to induce oxidative stress in the erythrocytes damaging effects of free radicals on RBCs are suggestive for the decrease in PCV values[45].

RBCs

This result shown in the table 2 indicated a significant decrease in red blood cells count in all groups of rats group. This study is in agreement with another study that indicated the decrease of RBC, which may be due to the formation of Heinz bodies during pesticide exposure resulting from the conversion of hemoglobin to methemoglobin the attachment of Heinz bodies to the plasma membrane increases membrane rigidity leading to increased red blood cell (RBC) lysis or its premature removal from circulation additionally the significant reduction in the TEC (total erythrocyte count) may be contributed by the effect of these toxicants in haemopoietic tissue this is especially in the light of studies that have shown the ability of pesticides to be toxic to the immune cells via the induction of necrosis and apoptosis[46]. The significant reduction in RBCs and Hb might be due probably to the inhibition of erythropoiesis and hemosynthesis, and to an increase in the rate of erythrocyte destruction in hemopoietic organs on the other hand, haemoglobin in

erythrocytes, is a major source of radical production giving rise to superoxide radicals, hydrogen peroxide and in certain cases peroxy radicals leading to membrane lipid peroxidation and hemolysis [47].another study indicated the rat that was exposed fenvalerate leads to decrease the count of red blood cells (RBCs) significantly this result may be because suppression of erythropoiesis and hemoglobin synthesis. Other causes suggested that the reduction in RBC and Hb content could be probably due to the blockage of protein synthesis and histogensis [48].

WBCs

In our study table 2 shows significant increase in WBCs count in all groups of rats This result is in agreement with another study that indicated that WBCs significantly increased after it is exposure to acute concentration of CYP in treated group, WBCs count showed positive relation with time and reached to maximum the increase in number of WBCs may be related to the stimulation of immune system due to tissue damage or may be related to compensatory response of lymphoid tissues to circulating lymphocytes[49]. Another study showed increased WBC counts in treated mice to insecticides and pesticides such as aldrin, diodine, endosulfan, fenvalerate, lindane, which may be due to the activation of a protective mechanism against the xenobiotic also increase differential counts in experimental animals exposed to insecticides[50]. WBCs count are related to the defense mechanism and they consist of lymphocytes, thrombocytes, monocytes and granulocytes. Monocytes and granulocytes play function in the removal of injured cell debris, while lymphocytes related to the production of antibodiesOther study also indicated significantly increased white blood cell (WBC) counts in rabbits following daily oral administration of fenvalerate which may be result from the mobilization of the immunological system and/or a shift in the leukocytic pool from the spleen to peripheral blood[51]. Another study also indicated an increase in the number of leukocytes in peripheral blood when they were treated with other pesticide such as fenvalerate ,cypermithrin, and deltamethrin.[52]

Platelet count

The result obtained in the table 2 indicated a significant decrease in platelet in all groups of rats. This result is in agreement with another study that indicated decrease of platelet as a result of estrogenic effect of LCT on hematological parameters because it might be due to its estrogenic action on hematological parameters [53]. It may be duo to suppressive and toxic effect on bone marrow because platelets are synthesized in bone marrow[23]. Another study against indicated that platelet Platelets counts showed no significant change for various experimental groups when exposed rats were compared to non-exposed rats for both transfluthrin and d-allethrin[54].

Hormonal blood criteria

Effect of fenvalerate on some hormones(FSH, LH and testesteron)

The results showed significant decrease ($P \leq 0.05$) in all groups of rats. This study agrees with another study that indicated fenvalerate has inhibitory effects on FSH-stimulated steroidogenesis which may be due to an inhibition of cAMP production [55]. Another study showed that rats treated with other pesticide such as α-cypermithrin have the same result, decrease in FSH and LH and testosterone this result may be either direct effect of the α- cypermithrin on the androgen biosynthesis pathway in the testis or it is effect on brain hypothalamus / anterior pituitary gland , may be indicated by affecting the testis and sexual function[56]. Another study also showed decreasing of FSH, LH and testosterone levels significant alterations in FSH, LH and testosterone levels have been reported after being exposed to certain pesticides , i.e., exposure to environmental contaminants adversely affects testicular function by decreasing pituitary LH secretion and reducing Leydig cell steroidogenesis[57].Almost studies indicated that most insecticides inhibit the non-specific esterase activity in Leydig cells that result in reduced testosterone production it is well established that organophosphorous pesticides reduce acetylcholinesterase activity and block nerve impulses this effect may alter the release of pituitary hormones, FSH and LH and testosterone[58] .

Effect of fenvalerate on Spermatogenesis cells

The result in Table 4 showed significant decrease in spermatogenesis cells in all groups of rats after fenvalerate treatment compared with control group. This result is in agreement with another study which

showed that the exposure to pesticides interferes with spermatogenesis by damaging the testes. The severity of 1142 infection depends on the stage of differentiation, These effects are transient because spermatogenesis is restored from stem cell populations after the removal of the off ending chemical [59]. Another study has reported that impairments of cypermithrin on male reproductive system through inducing impairment of the structure of seminiferous tubules and spermatogenesis that cypermithrin could be considered as a cause of the degeneration of germinal epithelium which is needed for normal spermatogenesis. We hypothesized that reduction in serum testosterone level caused by cypermithrin impaired the structure of testis and consequently suppressed spermatogenesis [60]. Another study that shows an organochlorine pesticide, impairs testicular functions and fertility. It may be disrupted testicular morphology, decreased spermatogenesis and impaired reproductive performances in males. On the other hand, a high dose of 2-bromopropane decreases spermatogenesis by adversely affecting Spermatogonia followed by depletion of spermatocytes, spermatids, and spermatozoa, with subsequent testicular atrophy [61]. It was shown that LCT (Lambda-cyhalothrin) in certain doses disturbs the process of spermatogenesis in male rats, which may be due to the violation of the hormonal regulation of reproductive function in men[62] . Other study indicated fenvalerate haveharmful effects on male reproduction. Thus, exposure of rats to elevated doses of fenvalerate not only being proved toxic to the testis and epididymis, but also decreased sperm counts as well as absolute weights in both organs [63] .Fenvalerate has a potentially adverse effect on male reproduction and spermatogenesis, whereas the precise mechanism remains obscure. Fenvalerate on germ cell apoptosis in testes [64].Another study showed that insecticides lead to spermatogonial depletion and atrophy due to pesticides toxicities in the seminiferous tubules. that may exert a direct inhibitory action on the testis; they may affect the pituitary causing changes in gonadotropin concentration, and may change the concentration of the neurotransmitter acetylcholine . The hazardous effect of these pesticides on semen quality continued during the post treatment period [65].The present study has arrived at the following conclusion: The effects of the insecticide toxicity also included many of the changes in physiological and biochemical parameters, and therefore this kind of insecticide is a comprehensive toxicity.

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