J. Env. Bio-Sci., 2013: Vol. 27 (2): 277-279 ISSN 0973-6913 (Print), ISSN 0976-3384 (On Line)

HAEMATOLOGICAL CHANGES IN ALBINO RATS ON SHORT TERM EXPOSURE OF DIAZINON

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Received: 05.10.13 **Accepted:** 31.10.13

Diazinon is an organophosphate insecticide which acts as a poison to a wide variety of insects and mites on contact. The rats were administered with the dose of 5mg/kg b.wt./day and 10mg/kg b.wt./day of diazinon for 7 and 15 days. The effects of diazinon on different haematological parameters showed a decline in Hb%, RBCs, PCV and MCV, MCH, MCHC and ESR increased significantly. The aforesaid observations indicate that the pesticide causes considerable damage to general physiology of body even if its intake is very low in quantity and for a short duration.

The control of insect pests relies heavily on the use of synthetic insecticides. But, their widespread use has led to some serious problems imcluding toxic residues on grass and toxicity to non-target organisms such as mammals, birds and fishes[1-4]. The organophosphate insecticide diazionon has agricultural and commercial uses and it is used to control a variety of insects, primarily aphids, beetles, scales and pill bugs in the household environment. It is usually sold by the trade name Knox-out, Dianon and Basudin.

The pollution of the environment plays a curcial role in the occurrence of many diseases affecting plants, animals and man. One of the main factors causing pollution of the environment is the irrational use of organophosphorus insecticides[5].

It has been reported that organophosphorus pesticide cause hazards to several non-target organism in fresh water ecosystem[6]. Enzymatic degradation of diazinon in rat liver microsomes has been reported[7]. Ethyl parathion cause hypertrophy of the hepatocytes and congestion of blood vessels and parenchyma in rat liver[8]. Endosulfan induced haematological changes in fishes and rats have also been reported[9,10]. Organophosphate poisoning also causes intermediate syndrome[11]. Diazinon may be found in formulations with variety of other pesticides such as pyrethrins, tindane and Disulfoton. Since diazinon is used in preparation of many other pesticides its short term exposure effect was studied.

MATERIAL AND METHODS

Diazinon is an organophosphate insecticide with agricultural, commercial and household uses predominate, with 75 millions application in the US annually totaling over 5 millions pounds. It is also used to control cockroaches, silver fish, aunts and fleas. It is used on rice, fruits trees, sugarcane, corn, tobacco, potatoes and on horticultural plants. Diazinon has veterinary uses against fleas and ticks.

The animals of one control group and one experiment group was sacrificed. The animal module selected for the experiment was sexually mature albino rats (Rattus norvegicus) of 60-130 gm body weight. The animals were acclimatized under controlled laboratory conditions on standard diet and water ad libitum. Experimental groups had received a definite dose of Pesticide in combinations with coconut oil, sugar and wheat flour.

Blood samples were obtained through vein puncture and haemological parameters were measured using different experimental techniques. The haematological parameters examined were Haemoglobin percentage(Hb%) by Gouvers haemometer using 0.1N HCl as dilutant, Erythrocyte count (RBC) were counted with the help of haemocytometer (Neaubauer's Counting Chamber), Packed cell Volume (PCV) estimated by ultra-micromethod. Mean Cell Corpuscular Volume (MCV),Mean Corpuscular Haemoglobin (MCH), Mean Corpuscular Haemoglobin concentration (MCHC) by Nour-Eldrin methods and Erthrocyte sedimentation rate (ESR) test done by westergentube.

RESULTS AND DISCUSSTION

Animals treated with 5mg/kg b.wt/day and 10mg/kg b.wt./day remained quite active in the beginning. Their appetite was normal and no visible changes in the behaviour were observed. But after 7 days of treatments, animals from both experimental groups gradually became lethargic. The loss of appetite was observed and the eyes starting buldging out. Gradually, hair coat became dull and later on skin turn patchy due to loss of hair. The changes were more intensified in the higher dose group then the lower dose.

Hb% was decreased in animals treated with 5mg/kg b.wt./day and 10mg/kg b.wt./day after 7 and 15 days of treatment But the decrease was in insignificant in animal treated with 5mg/kgb.wt/day and significantly in animals treated with 10mg/kg b.wt/day. The RBCs was decreased in animals treated with both the groups after 7 and 15 days of treatment. The Packed Cell Volume (PCV) was decreased significantly in animals treated with 5mg/kg b.wt./day and 10mg/kg b.wt./day after 7 and 15 days of treatment. These finding shows that probably haemolysis of corpuscles occur.

Table 1. Haematological alterations in albino rats after 5mg/kg b.wt/day diazinon administration

Status		Hb%	RBCs	PCV	ESR	MCV	MCH	MCHC
		gm/dl	Mill/mm^3	%	Mm/hr	pg	fl	gl
Control	Mean	13.11	6.39	40.4	1.27	61.52	20.01	32.4
	SD	±0.84	±0.95	±3.04	±0.33	±13.39	±3.86	±1.18
Treated (7days)	Mean	13.21	5.33	41.47	1.51	77.92	24.78	31.8
	SD	±0.84	±0.34	±11.32	±0.60	±20.94	±2.29	±13.2
Treated (15days)	Mean	12.8	5.19	39.9	2.28	76.34	24.56	32.17
	SD	±0.73	±0.1	±5.22	±0.57	±10.14	±1.3	±4.69

Table 2. Haematological alterations in albino rats after 10mg/kg b.wt/day (7&15days) diazinon administration

Status		Hb%	RBCs	PCV	ESR	MCV	MCH	MCHC
		gm/dl	Mill/mm^3	%	Mm/hr	pg	fl	gl
Control	Mean	13.11	6.39	40.4	1.27	61.52	20.01	32.4
	SD	±0.84	±0.95	±3.04	±0.33	±13.39	±3.86	±1.18
Treated (7days)	Mean	11.7	4.15	36.38	2.12	69.39	21.22	23.74
	SD	±0.72	±0.46	±3.6	±0.53	±13.8	±9.77	±11.1
Treated (15days)	Mean	10.9	5	32	2.4	64.18	21.84	34.02
	SD	±0.69	±0.51	±2.07	±0.54	±5.6	±2.88	±3.51

The Erythrocytes Sedimentation Rate (ESR) was increased in animals treated with 5mg/kg b.wt./day and 10mg/kg b.wt./day after 7 and 15 days of treatment. These finding shows that probably the toxins are causing death and disruption of erythrocytes. It has been reported that similar changes on administration of Baccharin and Phosphamidon respectively[12,13].

Significant increase in MCV, MCH and MCHC were observed in treated animal. Since the mean corpuscular Volume (MCV) is increased it is indicative of macrocytic anemia causes due to diazinon . All changes occurring in the haematic parameters shows that the pesticide causes macrocytic anemia and enhances the erythrolysis in blood. Therefore affecting the general the health of animals.

The hematological parameters RBC and Hb were significantly decreased in Diazinon treated albino rats whereas the erythrocytes sedimentation rate was increased significantly as compared to control. The effect of organophosphorus

pesticide on the Hb of several workers has been studied[14,15]. It has been reported that reduction in RBCs and Hb%[12,13].

Packed Cell Volume (PCV) decreased significantly after oral administration of Diazinon.In the animals treated with 10mg'kg b.wt/day dose it nose-dived between 7 and 15 days of treatement. These findings show that probably haemolysis of corpuscles occurred. Earlier, Initial decrease in PCV in pesticides treated rats[15,17,18]. PCV value decreased significantly due to decline in RBC count with increase in concentration of the pesticide.

The Erythrocytes sedimentation rate (ESR) was increased in the blood of Diazinon treated rats. The increase in ESR showa increase in RBC cell death rate. It is probably due to the oxygen deficiency in the blood of animals. A decline in ESR value observed in rats due to exposure of Saccharin, methyl parathion and phosphamidon trated rats[17,18]. Similarly, Fluctuations in ESR is also reported on exposure of BHC19.

Mean Cell Corpuscular Volume (MCV),Mean Corpuscular Haemoglobin (MCH) , Mean Corpuscular Haemoglobin concentration (MCHC) was increased after administration of diazinon. It is evident that the reduction in the number of RBCs and the haemoglobin contents and increase in MCV, MCH and MCHC volume might cause macrocytic anemia in the experimental animals. Similarly, an increase in MCV, MCH and MCHC in pesticides treated rats[15,19] earlier.

The variations in Haematological parameters shows toxic manifestations of short term exposure of diazinon. It is suggestive of harmful effects on the workers engaged in its formulations and using this pesticide on crops. A careful monitoring of haematological parameters of occupational workers is necessary to protect them from these adverse effects.

ACKNOWLEDGMENTS

The authors are thankful to Dr. Triveni Dutt, Principal D.N. P.G. Collge, Meerut. The authors are also thankful to UGC New Delhi for financial support extended for this.

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