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BIOCHEMICAL AND HEMATOLOGICAL CHANGES INDUCED BY DIMETHOATE (ROGOR30% EC) IN THE LIVER OF FEMALE RAT RATTUS RATTUS NORVIGICUS

Zoology

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ABSTRACT

The aim of the current study was to evaluate the sub chronic toxicity of orally administered dimethoate in female Rats, 20 adult female rats were used for the experiment the animals randomly divide into two groups each of 10.The first group of served as control they received normal diet and second group of the animals orally exposed with the dimethoate 1mg/kg/body weight upto 15 and 30 days. At the end of experiment in to this, the animals exposed to Dimethoate showed significantly increased in protein, cholesterol and creatinine levels in different duration i.e. 15 and 30 days. Whereas in hematological parameters, it has been noticed that the total number of RBC, WBC count and haemoglobin (Hb %), were significantly decreased in dimethoate treated animals for 15 and 30 days.

KEYWORDS

Dimethoate Protein, Cholesterol, Creatinine, and Haemoglobin.

INTRODUCTION

Dimethoate an important organophosphorus insecticide, is frequently used in agriculture against a wide range of insects and mites and for indoor control of houseflies. (Sharma Y., *et al*., 2005) It causes health problems to producers, workers and farm owners. Generally, the majority of the population is chronically exposed to low doses of dimethoate via food, contaminated drinking water, or by application of household insecticides containing (WHO 2001). Numerous studies indicate that dimethoate intoxication can cause oxidative stress by the generation of free radicals and induce hepatic lipid peroxidation in mice (Sivapiriya *et al.,* 2006) and in rats (John *et al.,* 2001; Sharma *et al.,* 2005; Kamath *et al.,* 2008). The toxicity of organophosphorus pesticides results deterimental effects on many organs and systems such as liver, kidney, nervous system, immune system and reproductive system (Kossmann *et al*., 1997). Administration of dimethoate to pregnant rats produced enzymatic changes associated with mild pathomorphological changes in liver and brain but no teratogenic effects were observed.

MATERIALS AND METHODS:

In the present experimental investigation thirty adult female rats, *Rattus rattus norvigicus* weighing 150±5gm were used for the experiment each of 10 animals. The animals were housed in universal galvanized wire cages at room temperature (22 ±2 ºC) and in photoperiod of 12-12 light/dark cycle. The rats were acclimatized for 2 weaks prior to the start of the experiment. Rats were maintained on commercial pellet diet. Animals were divided into three groups

Group (1): The animals in this group were used as control was fed with standard rats feed and *water ad libitum*.

Group (2): Animals in this group received a daily dose i.e.1mg/ 0.5ml/ 150g/kg b .wt. (dissolved in olive oil) of dimethoate (Rogor 30% EC) orally through canula for 15 days.

Group (3): Animals in this group were given the same concentration of dose for 30 days.

RESULTS:

It has been observed that animals exposed with dimethoate (1mg/kg body weight) up to 15 and 30 days showed significantly increased in protein, cholesterol and creatinine levels in comparison to control group (Table 1, Fig. 1, 2, and 3).

In the haematological parameters, it has been noticed that the total numbers of RBC and haemoglobin (Hb%), was significantly decreased after 15 and 30 days of treatment of dimethoate as compared to the control and treated groups. Beside the number of leucocytes (WBC) percentage were significantly increased after 15 and 30 days as compared to the control and dimethoate treated groups (Table 2, Fig.4, 5, and 6).

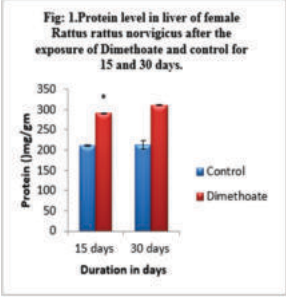
Table: 1 Biochemical and Haematological parameters of female rat *Rattus rattus norvigicus* after the exposure of Dimethoate and control for 15 and 30 days.

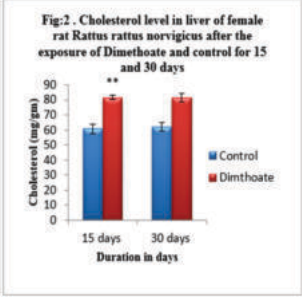
Duration		15 days		30 days	
Parameters	Groups	Control	Dimethoate	Control	Dimethoate
	Protein (mg/g)	210.35±2.25	290.14±10.11□	212.53±9.11	310.14±6.15
	Cholesterol (mg/g)	60.66±2.87	81.68±1.25□ □	62.32±2.83	81.32±2.78
	Creatinine (mg/g)	0.82±0.07	1.23±0.15□□ □□	0.92±0.06	1.21±0.13□

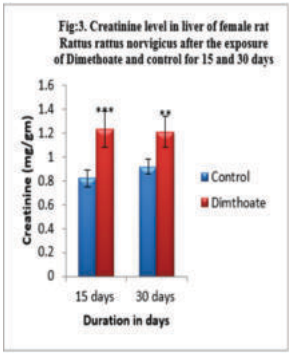
Table: 2

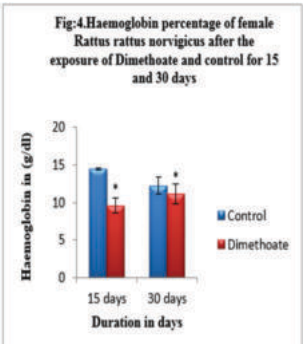
Duration		15 days		30 days	
Parameters	Groups	Control	Dimethoate	Control	Dimethoate
	RBC (Million/ mm3)	7.61±1.10	12.43±0.87□	8.22±1.03	10.98±1.58
	WBC (Thousands/ mm3)	8.78±0.12	5.11±0.87□□ □□	8.21±0.65	6.41±1.25□
	Haemoglobin (g/dl)	14.5±0.09	9.6±1.01□	12.25±1.12	11.14±1.34

± SEM of five animals;*Significant different (P<0.05) from control by students't' test;**More significant different (P<0.001) from control by students 't' test.: ***Highly different (P<0.001) from control by students 't' test.









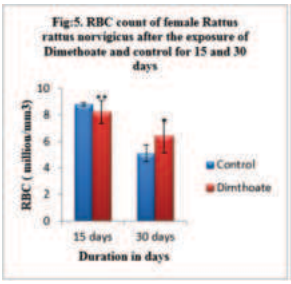


Fig:5. RBC count of female Rattus rattus norvigicus after the exposure of Dimethoate and control for 15 and 30 days

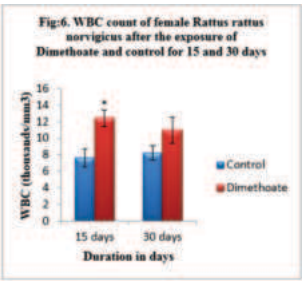


Fig:6. WBC count of female Rattus rattus norvigicus after the exposure of Dimethoate and control for 15 and 30 days

± SEM of five animals;*Significant different (P<0.05) from control by students't' test.;**More significant different (P<0.001) from control by students 't' test.;***Highly different (P<0.001) from control by students 't' test.

DISCUSSION:

In our investigation showed the chronic exposure of the dimethoate of female rats protein cholesterol and creatinine was significantly (p<0.01) increased. Dimethoate administration resulted in a significant decreased in serum total protein, albumin and globulin. The reduction in serum protein particularly albumin could be attributed to changes in protein, and free amino acid metabolism and their synthesis in liver. Also the protein level suppression may be due to loss of proteolytic activity or degradation protein either by reduced in protein synthesis or increased (Yeragi *et al*., 2003). Sayim F., (2007) reported the protein level were significant increased after the exposure of the dimethoate at the different level of dose. Ahmed *et al*., (2009) noticed in this work the cholesterol and creatinine levels were significant (p<0.01) increased It is well known that the cholesterol in the main precursor for steroidogenesis and it is produced mostly in the liver from LDL and HDL (Johnson *et al*., 2003).

The haematological results indicate that the RBC count and haemoglobin level significantly decreased in the blood of female rat after the exposure of dimethoate. On the other hand our results showed that the numbers of leucocytes percentage significantly increased in the treated rats. This mean that the defense mechanism represented in leucocytes could compensate the toxic effects of the dimethoate. The numbers of blood cells elevated in female rats exposure with dimethoate. In our this finding are in agreement with Khogali *et al*., (2005) and Mohammad *et al*., (2012) who found that the dimethoate reduced Hb and PCV in albino mice and (Salih 2010) who observed that dimethoate administered to rabbits decreased Hb and total RBC count The decrease in the Hb along with the decrease in the RBC may be due to the effect of pesticides on blood forming organ such as bone marrow and liver and inhibition of many steps of heme biosynthesis in rabbits as the result of pesticides exposure The poisoning by pesticide residues leads to the development of anemia due to interference of Hb biosynthesis and shortening of the life span of circulating erythrocytes (Betrosian 1995; and Jyotsana *et al.,* 2003).

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