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ACUTE TOXICITY OF DIMITHOATE ON HAEMATOLOGY OF *MUS MUSCULUS (LINN.)*

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ABSTRACT

Pesticide hazards have been accentuated by the sharp rise in their agricultural, industrial and domestic use. Our study investigated the toxic effects of the dimethoate, anorganophosphorus pesticide, on some blood parameters i.e., red blood cells, white blood cells count and haemoglobin contents of Mus musculus.Thirty healthy micewere dividedinto three groups, each of ten. Group first was served as control and fed withonly thevehicle (groundnut oil). Mice of group II and III were fed withpellets diet and received dimethoate (150mg/kg b.w./ day) mixed with 0.05ml groundnut oil orally for 30 days.

In our result we find that exposed mice showedsignificant ($p<0.001$) decline in the haemoglobin content initially for 15 days andfor later part of experiment more severe decline noticed as compared to control.The RBCs count decreases significantly ($p<0.001$) in 15 days and 30 days treatedgroup as compared to control. WBCs count was increased significantly ($p<0.001$)in 15 days experiment as compared to control, while it decreased after 30 daysexperiment as compared to 15 days treated mice.

The results showed that the degreeof alteration in hematology were proportional to theexposure periods and concentration of the chemical was found during theexperiment.

KEYWORDS : Dimethoate, Haematology, Mus musculus.

INTRODUCTION

The common use of insecticides in public health and agricultural schedules has caused severe acute and chronic cases of human and animal poisoning (Moghadamnia AA,*et al,*. 2002).The environmental pollution is one of the most serious problems that faces mankind in this century. There are any types of pollutants that interfere with our-life both directly or indirectly.Furthermore, potential future hazards to human health and wildlife can be created by residues from some long-live pesticides that may build up in the food chain and cause widespread contamination of the environment (El-Sebae, 1993; Zaahkou*et al*., 2000).

Nowadays, the hazards of pesticides have been accentuated by the sharp rise in their use byfarmers, industrialists and householders alike. Pesticide poisoning resulting in death occurs mainly in developing countries where the consumption of these products is high (Banerjee *et al*., 1999). Organophosphate (OP) compounds are the most toxic pesticides causing environmental pollution and potential health hazards (Agdi*et al*., 2000). Dimethoate, are the widely used systemic pesticides in agriculture against a wide range of insects, mites and fungal diseases of vegetables, fruits, or namental plants and field crops as both systemic and contact pesticides and are also used indoor to control houseflies (Meister, 1992; Farag *et al*., 2006; Brkic*et al*., 2008 and Muthuvivegandave*et al*., 2011).

The present studies have been aimed to establish an account of whether low dose of dimethoate as pesticide has any non-target effect on humans or other animals. The micewere selected as the test species of mammals. So, we focused to investigate the alteration in haematological parameters which might occur as a result of dimethoate intoxication in *Mus musculus*.

MATERIALS AND METHODS

Chemical:

Dimethoate (30 EC, 98.4% pure S= CH3NHCOCH2SP(OCH3)2 under the trade name Rogar wasbrought from local market of Darbhanga Bihar.

Animals and dosing

For present investigation 30 adult mice weighing 20 ± 2 gm were obtained from a local grocery store at Lalbagh, Darbhanga, Bihar and they were acclimatized at 25±2^{o}C with a 12hours light-dark cycle for 15 days in the laboratory ofC. M. Science College, Department of zoology, Darbhanga, Bihar.

The animals were divided into three groups. Group I served as controlconsists of10 animals were fed with normal pellets diet and 0.05 ml groundnut oil. Group II and Group III consist often animals each fed normal diet with water *ad libitum* throughoutexperiment and received dimethoate(150mg/kg b.w/day) mixed with 0.05 ml groundnut oil orally with the help of pearl point needle for 15 and30 days. The animals were provided with rat feed and Weight of mice was recorded at the initiation and thetermination of experiment period.

At the end of the treatment period, on 16th and 31st days the animalswere weighted and anaesthetized by using ether, Miceare lost mobility and equilibrium within 3 to 4 minutes. The anaesthetized mice were placed on its back and blood was collected by cardiac puncture through a tuberculin syringe and needle of 21 no. the collected blood was mixed with anticoagulant, heparin (100units, Biological Evans Limited). Blood samples with anticoagulantwere analysed for blood parameters namely red blood cell counts, white blood cell counts andhaemoglobin percentage (Chinoy NJ, Rao MV, Derasari KJ, Highland HN, 1993 14).

Statistical analysis:

All data obtained from the present investigation was analysed by using statistical tools andthe significance of findings were analysed by using students 't'-test. (Fisher RA, Yates F, Statistical Tables. London, Oliver and Boyed.1953).

RESULTS

Haematological studies

Haemoglobin and erythrocyte count were decreased in compared to control group significantly in 15 and 30 daystreated mice and in later part of the experiment, Leucocytes count was increased significantly in15 and 30 days treated mice as compared to control.

Table 1:
Vaules of R.B.C,W.B.C. and Haemoglobin content in blood of control anddimethoate (3mg/b.wt/day) exposed*Mus musculus*after 15 and 30 days exposure.

S. No.	Groups	R.B.Cs(106/mm3)	W.B.CS(103/mm3)	Hb (g/dl)
1.	Control	8.141 ± 0.015	10990.524 ± 95.645	15.931 ± 0.044
2.	Treated (15 days)	6.655 ± 0.031*	11992.600 ± 35.488*	10.980 ± 0.066 *
3.	Treated (30 days)	4.862 ± 0.068**	14626.642 ± 67.501**	8.146 ± 0.034 **

± = SEM value of ten animals, *= p<0.05, **= p<0.001

DISCUSSION

The animal model used in this study was used to assess the adverse effects of pesticides onlaboratory animals (Costa *et al.,* 1989).Present experiment was designed to evaluate the acute toxicity of dimethoate because of the importance of the compound e.g. its large-scale use as an insecticide in agriculture. Many studies have shown that acute and sub chronic exposure to dimethoate generates lipid peroxidation and alters the antioxidant status of several tissues in rats (Sayim F.,2007).

Haematological effects of dimethoate on mice have been studied in present study. Haematological parameters are sensitive index of the physiological changes of an animal to any environment pollutants and toxic stress of any nature shows significant changes in the blood. The decreases in Hb value is due to an increase in the rate at which Hb is destroyed. Iron is obtained from stored ferrite and a dietary source which is essential for synthesis of Hb. Intoxicated mice reduce the food intake capacity and there is no other source of iron intake, might be the reason for iron deficiency. The poisoning by pesticide residues leads to the development of anaemia due to interference of Hb biosynthesis and shortening of the life span of circulating erythrocytes (Betrosian A., *et al., 1995 and* .Jyostana AP, *et al.,*2003). Due to toxicity there is destruction of erythrocytes or inhibition of erythrocytes production, which

decrease the R.B.Cs count in mice. Deficiency of vitamin B12 and folic acid leads to impaired synthesis of nucleic acid resulting in defective maturation of erythrocytes and their nuclei (Abdollahi M, *et al.,* 2004). A similar decrease of R.B.Cs and the haemoglobin has been reported in mice given sub-acute dose of organophosphate (Karanthi S, Lice J, *et al.,* 2004).

The finding of the present work in which significant decrease in RBC, haemoglobin was observed whereas significant increase in WBC total count.

CONCLUSION

In conclusion, the results of the present study suggested that the dimethoate has adverse effects on someblood parameters these changes may be induced bydimethoate directly or indirectly to tissues depending on dose and duration. More over extensive studies areneeded to evaluate the toxicity of dimethoate at molecular level because genotoxic chemicals such asinsecticides have common chemicals and physical properties that enable them to interact with genetic materials.

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