



DIMETHOATE INDUCED HAEMATOLOGICAL ALTERATIONS IN *LABEO ROHITA* (HAM).

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ABSTRACT:

Dimethoate induced haematological study in fresh water teleost, *Labeo rohita* (Ham). It accumulates in the soft tissues of the body and interfer with metabolic processes. In this study, certain haematological investigation were recorded in the Dimethoate treated fish.

Erythrocytes and lymphocytes (small) increased in the initial stages of treatment but decreased in later exposures. Haemoglobin showed a significant elevation after 150 hrs of exposure but decreased gradually in later exposure. Monocytes, lymphocytes (large) and neutrophils exhibited a steady fall in number. After initial reduction, basophils and eosinophils increased but were significantly reduced in further exposures. Thrombocytes exhibited a general trend of proliferation.

KEY WORDS:

Dimethoate, Haematological, Alterations, *Labeo rohita*. (Ham).

INTRODUCTION:

Insecticidal activity of organophosphorus compounds was first discovered when "Bladen" was used in Germany in 1944 as a substitute for scarcely available nicotine sulphate. Schrader in Germany made available a report to the allied administration in West Germany after the conclusion of the World War II on the basis of which the insecticidal properties of organophosphorus compounds were associated to the structure (RO)₂ PXZ.

Organophosphorus pesticide uses have greatly increased in the pest control in agriculture, mainly because of their low persistence. These pesticides once applied to the field do not remain there, but are blown out or washed away by rain to rivers, lakes, ponds and sea (Edwards 1973), thereby adversely affecting growth and survival of the fish (Johnson 1973.) The kidney, as an organ for the excretion of waste materials from the body, is constantly exposed to harmful effects of the foreign materials, including insecticides (Mount and Putnicki 1966, Metelv et al. 1977).

Haematological studies have been widely made on fishes by a number of workers such as Kadam *et al.* (2023), Ali (2024), Hemprabha (2025), Girija *et al.* (2025), Rao & Makwana (2026) and Bhosle and Saraf (2026).

Dimethoate is a systemic organophosphorus insecticide chemically named as [O, O-demethyl-S-(N-methylcarbamoyl methyl) phosphorodithioate] and was first introduced in 1956. It is also known as Rogor which is used against sap feeding insects by spraying with 30% emulsified concentrate. Dimethoate is a systemic organophosphorus insecticide with a broad spectrum of biological activity which is used to control aphids, jessids, white flies, scale insects, meely bugs, plant bugs, fruit flies, stem borers, mites and thrips. These insects are found on the crops of cotton, chillies, tobacco, vegetables, paddy, tea, ground nut, citrus fruit and others.

Dimethoate interferes with nearly all the metabolic processes and accumulates in the soft tissues of the body. Information's available regarding Dimethoate intoxication in fish haematology are scanty. In this study, certain haematological parameters of Dimethoate treated fish were recorded and compared with untreated controls.

MATERIALS AND METHODS :

Live specimens of *Lebeo rohita* (Ham). were obtained from local fish catchers of Distt. Etawah. Specimens (weight 75.00 ± 2.00 gm) were used for this study after disinfection in 0.1% of Potassium per manganate solution and acclimatization to laboratory condition for a week. The blood was taken from individual animal by cutting a flap in the ventral body wall and puncturing the engorged sinus venosus.

The caudal end was washed with distilled water and blotted dry with the help of clean Turkish towels. Blood was collected either from caudal vessels by severing the caudal penducle or directly from ventral aorta and heart. Anticoagulant EDTA or double oxalate was used. Fish of almost similar size were taken for control and exposed to 50 ppm Dimethoate for 150, 350 and 500 hrs. Following haematological parameters were studied by routine methods (Dacie & Lewis, 1975).

Total erythrocyte count, haematological concentration, mean cell and differential leucocyte count were done. Group means were compared by student's 't' test analysis.

RESULTS AND DISCUSSION:

After exposure of the fish to 50 ppm of Dimethoate the erythrocytes decreased gradually. Haemoglobin, a direct measure of oxygen carrying capacity of blood, showed significant elevation after 150 hrs of treatment but decreased in later exposures. There was a steady fall in the number of monocytes, lymphocytes (large) and neutrophils. The lymphocytes (small) increased in number after 150 hrs of exposure but decreased during later exposures. An initial reduction in the number of basophils and eosinophils was noticed but they increased after 350 hrs or Dimethoate intoxication. After 500 hrs of exposure, the basophils and eosinophils were significantly reduced. The thrombocytes exhibited a general increase in number.

In this investigation, decrease in total erythrocyte count was noted due to Dimethoate treatment. This anemic condition of fish can be attributed to haemolysis or erythropoietic disorders which seems to be brought about by the Dimethoate treatment.

In the present study, the haemoglobin concentration increases in the beginning of the dimethoate treatment but reduces after further exposures which may be due to elevation in haemoglobin synthesis in the beginning but due to deficiency of iron later, a steady fall was recorded in further exposures.

Significant increase in the number of lymphocytes and a steady fall in the number of neutrophils and eosinophils was noted in carbon tetrachloride exposed *Clarias batrachus* (Linn.) by Sharma and Gupta (1982). The same facts were observed by Qayyum *et al.* (1976) and Shami *et al.* (1978). Dimethoate intoxication resulted in the reduction of monocytes and lymphocytes causing

monocytopenia and lymphocytopenia respectively and an elevation in the number of thrombocytes causing thrombocytosis. Fluctuations in the relative number of different granulocytes due to Dimethoate administration affected the production of antibodies and phagocytic character of leucocytes as a results of which the fish became stressed.

ACKNOWLEDGMENTS:

Authors are greatly indebted to Dr. K.K. Saxena, Dean of the Science faculty, Ch. Sughar Singh Educational Academy, Jaswant Nagar, Etawah (U.P.) for this constant guidance, suggestions and necessary help in this research paper. Our sincere appreciation goes to Dr. Yogesh Babu Dixit, Reader, Department of zoology, J.M.V. Ajitmal, Auraiya for providing necessary laboratory facilities.

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TABLE 1: EFFECT OF DIMETHOATE ON CERTAIN PARAMETERS OF *Labeo rohita* (HAM).

PARAMETERS	CONTROL	EXPOSURE LINE		
		150 hrs	350 hrs	500 hrs
ERYTHRCYTES (MILL/CU/MM)	2.08 ± 0.09	1.60 ± 1.25	1.35 ± 1.09*	1.10 ± 0.02
HAEMOGLOBIN (G/DL)	6.10 ± 0.60	8.30 ± 0.80*	7.09 ± 0.85*	5.08 ± 0.87
DIFFERENTIAL LEUCOCYTE COUNT (%)				
MONOCYTES	12.0 ± 1.15	4.4 ± 1.02*	4.8 ± 0.50*	3.6 ± 0.50*
LYMPHOCYTES (LARGE)	7.5 ± 0.40	2.0 ± 0.75*	1.5 ± 0.48*	1.5 ± 0.75*
LYMPHOCYTES (SMALL)	24.5 ± 1.01*	25.5 ± 1.10*	16.2 ± 0.30*	6.5 ± 1.01*
NEUTROPHILS	1.5 ± 0.80	2.0 ± 1.09	1.5 ± 0.50	1.0 ± 0.65
BASOPHILS	5.4 ± 1.5	1.5 ± 0.48*	4.0 ± 1.41	1.2 ± 0.30
EOSINOPHILS	7.1 ± 0.50	6.5 ± 0.65	11.0 ± 0.89*	7.5 ± 1.50
THROMBOCYTES	42.0 ± 3.05	50.2 ± 1.25*	65.6 ± 1.01*	75.0 ± 2.50*

Values are mean ± S.D. (n=5)

*Values are significant at p<0.001