

# Periodic Research

## Studies of Haematotoxicological Effects of DDT on Fresh Water Teleost *Saccobranchus Fossilis*

### Abstract

DDT (Dichlorodiphenyltrichloroethane) is widely used as chlorinated pesticide to control insects by agricultural and public health agencies, farmers etc. It has been observed that DDT treatment caused a dose dependent decrease in hematological parameters such as total count of RBCs, WBCs present, hemoglobin and packed cell volume.

**Keywords:** DDT, Haematotoxicology, Packed Cell Volume.

### Introduction

DDT is an organochlorine insecticide has been extensively used in India in the pest, particularly to control the mosquito to prevent malaria. DDT is a very common fat soluble chlorinated hydrocarbon. The bulk of this chemical are used in agriculture, for forest protection and in public health programs. Many of the more persistent pesticides DDT are the common pollutants of aquatic ecosystem.

The fish immune system is well defined (Anderson 1974; corbel 1975) and has many sensitive parameters where alteration as a result of pollutant exposure are easily determined (Zeeman and Brindley 1981) Saleem Mustafa and Ajmal Mured 1984, Denier and Siwicki (1993) reviewed the literature on the effects of pesticides including organochlorine pollutants on fish immune system. Prasad et al, (2011) studied the effect of botanical pesticides latex of *Euphorbia royleana* on the blood electrolyte of the *Heteropneustus fossilis*.

The significance of this study to has shown the suppressive effect of organochlorinated insecticide like DDT on the fish immune system.

### Materials And Methods

The fish weighing 20-25 gm. were divided into three groups of six fish in each - Control, DDT-0.05mg/l, DDT-0.10mg/l for four weeks exposure. The aquarium water was changed after 24 hours. Fish were acclimatized to laboratory condition for three weeks before the experimentation. Total count of red blood corpuscles (RBCs), white blood cells (WBCs), hemoglobin content (Hemoglobin) and packed cell volume (PCV) were determined by routine procedure. (Wintrobe 1974). The significance of differences was calculated by student 't' test (Fisher 1950)

**Table : Effects of DDT on selected blood parameter of fish, *Saccobranchus fossilis***

Treatment Parameters	Control	DDT (0.05mg/l)	DDT (0.1mg/l)
RBC ( $\times 10^6/\text{mm}^3$ )	4.87 $\pm$ 0.16	4.29 $\pm$ 0.18	3.95 $\pm$ 0.21 <sup>b</sup>
WBC ( $\times 10^6/\text{mm}^3$ )	6.49 $\pm$ 0.14	5.32 $\pm$ 0.18	4.93 $\pm$ 0.25 <sup>a</sup>
Hb (GM/100ml)	12.8 $\pm$ 0.16	12.00 $\pm$ 0.20	11.6 $\pm$ 0.38 <sup>b</sup>
PCV ( $\times 10^6/\text{mm}^3$ )	40.33 $\pm$ 2.40	32.41 $\pm$ 2.20	29.0 $\pm$ 2.09 <sup>b</sup>

Values represented mean  $\pm$  S.E., n=6

ap < 0.001

bp < 0.01

### Result And Discussion

The hematological parameters like total count of Red blood cells, white blood cells, Hemoglobin content and packed cell volume, values were studied in control, 0.05mg/l, DDT and 0.10mg/l DDT exposed fish. It has been observed that DDT treatment caused a dose dependent decrease in total count of RBC, WBC%, Hemoglobin and PCV. At 0.1mg/l of DDT exposure more decrease in WBC count were observed as compare to control and 0.05 mg/l of DDT concentration. RBC count and Hemoglobin



**Ira Rastogi**

Assistant Professor  
Deptt. of Zoology  
Career Convent Girls Degree  
College, Vikas Nagar  
Lucknow



**Smita Shukla**

Assistant Professor  
Deptt. of Zoology  
Career Convent Girls Degree  
College, Vikas Nagar  
Lucknow

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content showed a slight change in 0.1 mg/l of DDT exposure group than control fish values.

In the present study, significant reduction of RBC and WBC in DDT exposed fish showed immune suppressive responses. Similarly hemoglobin and hematocrit values showed significant reduction in the DDT exposed fish. Hematopoietic system of fish have been found to be a target for other pesticides and heavy metals (Garnener and Yevich, 1970) have been showed on the effects of Xenobiotics on the immune system of fish (Zeeman and Brindley, 1981; Wester et.al. 1994) and mammals (Sharma and Reddy, 1987)

A leuko and thrombopenia was reported after aldrin and mirex exposure (Zeeman and Brindley, 1981) similar observations are recorded in the catfish, Saccobranchus fossilis with low concentration of DDT in the present study.

In this study effects of DDT on Saccobranchus fossilis blood parameters were determined. There was significant decrease in R.B.Cs, W.B.Cs and hemoglobin content due to DDT exposure. The result of this experiments closely resemble to previous research (Misra and Srivastava, 1979; Pandey and Pandey, 1977; Gill and Pant, 1985)

In the present study an attempt has been made for the analysis of leukocytes, erythrocytes hemoglobin content and packed cell volume of the air breathing fish Saccobranchus fossilis blood. Most of this parameter reduced due to toxicity of DDT. Witt et al (1966) found a correlation between DDT level in blood and adipose tissues. A sub lethal concentration of Malathion induced decreased erythrocytes and an increased leukocyte count in a fresh water catfish Clarias batrachus (Mukhopadhyay and Dehadrai, 1980). Similarly Channa punctatus exposed to sub lethal levels of quinolphas for 15 days had lowered hemoglobin content (Sastry et al. 1982). Guha et al (1993) reported reduced level of total WBC following 0.5mg/l of DDT for 120 weeks in catfish. Clarias batrachus. Other pesticide diazinon exposed Channa species showed increased hematocrit value and hemoglobin content after 15-30 days exposure (Sastry and Sharma, 1981).

DDT has been extensively investigated in the past, particularly in humans, Chemo taxis and phagocytes reduction were significantly depressed in DDT-exposed workers who were also more susceptible to infectious diseases (Descotes, 1988). Effect of pesticides on the sperm mortality was also studied by Singh et al. (2008). The use of DDT is now forbidden in Europe and the USA, but several African and Asian countries continue to use it on cotton and other crops.

Pesticide-induced hematological changes such as those described above may also serve as tools for biological monitoring. If adequate information is available on the various psychological and biochemical parameters of blood. It may be possible to develop comparable clinical diagnostic tools for fish.

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