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# Alteration in Blood Glucose Level in a Fresh Water Fish Colisa Fasciatus under the Stress of Azodyes

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## ABSTRACT

The present study deals with the toxic effects of two azodyes Metanil yellow (4-aniline azobenzene-m- sulfonic acid) and Bismark brown (2,4- diamino 3 amino azo benzene) on the glucose level in the blood of a fresh water fish *Colisa fasciatus*. During present investigation a significant increase ( $p< 0.01$) was observed in the blood of *Colisa fasciatus* under the stress of two azodyes.

## INTRODUCTION

Environmental pollution is a world wide problem in a modern society. The extensive use of dyes has raised concerns about potential adverse effectson the environment, human health and non target animals. Unfotunately, the application of these dyes, pesticides and other pollutants are highly toxic to a number of non target organisms such as bees, fresh water fish and other aquatic organisms even at very low concentration[1-3]. Fishes are one of the most widely distributed organisms in an aquatic environmentand being susceptible to environmental contamination may reflect the extent of the biological effects of environmental pollution in waters. Monitoring of blood parameters , both cellular and non cellular may have considerable diagonostic value in assessing early warning signs of poisioning[4].

Blood is a pathophysiological reflector of the whole body. Knowledge on the physiological action of the toxicant help to predict an important sub lethal effects and analysis of biochemistry, hematology and histopathology may be used to determine the mode of action of the toxicant. In recent years, biochemical variables were used more when clinical diagnosis of fish physiology was applied to determine the effects of external stressors and toxic substances. Therefore, the biochemical evaluations are gradually becoming a routine

practice for determining the health status in fish. The biochemical parameters like Serum Glucose,Protien, Cholesterol, Creatinine and Creatine are widely used to determine the toxic stress[5].

## MATERIALS AND METHODS

Livining specimen of *Colisa fasciatus* were collected from local fresh water resources and acclimatized in laboratory conditions for a minimum period of seven days before experimentation. Visibly healthy fishes were selected and treated with 0.1% $KMno_4$ solution and divided into five batches. One batch was kept in water and was used as control. The remaining four batches were kept in acute and chronic concentrations of metanil yellow and bismark brown. Water was replaced periodically and black paper was used to prevent any possible photo-oxidation of the dyes. The fishes of all batches were sacrificed at 48 hrs. and 96hrs. ( acute exposure ) and 15 days and 30 days ( chronic exposure ). The blood was collected from cut caudal vein and was allowed to clot at room temperature and then centrifuged at 2000 rpm. The 't' test of Fisher[6] was used to calculate the significance of data.

## RESULT

The present study reveals a significant increase in the serum glucose level in the blood of *Colisa fasciatus* under the stress of metanil yellow and bismark brown. The increase was +2.94%, + 10.30%, at acute exposure ( $T_1$ and $T_2$ ), +14.69%, +16.18% at chronic exposure ( $T_3$ and $T_4$ ) in response to metanil yellow . Similarly the increase was + 3.87%, + 11.78 %, +13.12% and +15.18% in response to bismark brown at acute ( $T_1$and $T_2$ ) and chronic ( $T_3$and $T_4$) exposures respectively. All these elevations were statistically highly significant ( $P< 0.01$ ). Table No. 1.

## DICUSSION

Biochemical analysis can provide valuable information for monitoring the health conditions of fishes. Biochemical changes depend on the fish species age, the cycle of sexual maturity and health condition[7]. Moreover, analysis of serum biochemical constituents levels showed useful information in detection and diagnosis of

metabolic disturbances and diseases in fishes[8].

Determination of glucose concentration in blood serum is widely used as an indication of stress response. Generally, glucose is continuously required as an energy source by all body cells and must be maintained atadequate levels in the plasma[9]. In many fish species, the blood glucose level has the tendency to increase due to experimental stress. In the present study the significant increase in glucose may may be considered to be manifestation of stress induced by azodyes. Wedemeyer *et. al*.(1981)[10] stated that high levels of blood glucose are caused by disorders in carbohydrate metabolism appearing in the condition of physical and chemical stresses. A variety of stressors stimulate the adrenal tissue resulting in increased level of circulating glucocorticoids[11] and catecholamines[12]. Both of these groups of hormones produce hyperglycemia. It is generally thought that, under conditions of stress, hyperglycemia may provide additional energy during times of high metabolic need such as fight and flight response[13]. M. Ramesh and M. Sarvanan(2008)[14] found similar results in *Channa punctatus* when exposedto Chloropyrifos. E.Ogueji Okechuk Wu and J. Auta (2007)[14] also observed similar results in *Clarias garipinus*, exposed to Lambdacylathrin. B.Padma Priya, Vijaya Rachel and Y.Avasn Maruthi (2012)[15] also observed increase in serum glucose level in *Channa punctatus* exposed to Imidacloprid insecticide.

**TABLE -1**

**ALTERATION IN GLUCOSE LEVEL INDUCED BY 4' AASA AND DAAB IN THE BLOOD OF COLISA FASCIATUS. VALUES ARE ± S.E. OF NINE OBSERVATIONS EACH.**

| | | ACUTE EXPOSURE | | CHRONIC EXPOSURE | |
|---|---|---|---|---|---|
| **DYES** | **C** | **$T_1$** | **$T_2$** | **$T_3$** | **$T_4$** |
| 4'AASA | 176.60 ± 0.225 | 181.80 ±0.287 (+2.94%) | 194.79 ± 0.396 (+10.30%) | 202.56 ± 0.277 (+14,69%) | 205.19 ± 0.35 (+16.18%) |
| DAAB | 176.60 ± 0.225 | 183.45 ± 0.245 (+3.87%) | 197.42 ± 0.262 (+11.78%) | 199.78 ± 0.24 (+13.12%) | 203.42 ± 0.238 (+15.18%) |

4'AASA - Metanil yellow **$T_1$** - 48 hrs **$T_3$** - 15 days

DAAB - Bismark brown **$T_2$** - 96hrs **$T_4$** - 30 days

C - Control.

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