Dyes (mono azo and azo) constitute important water pollutants. The dyes especially azodyes discharged in inland water render tremendous chemicoazo stress on fish, with the result large number of fish are subjected to mortification.

*Labeo rohita* is very important edible fish due to its high nourishing and medicinal value and the texture of the flesh. In toxicological studies of acute and chronic exposures changes in concentration and enzyme activities often directly reflect cell or organ damage. Any stress inducing substance will affect the respiratory metabolism due to stress is bound to affect the activity of oxidative enzyme like LDH. LDH is an important glycolytic enzyme which is present in all animal tissues. The enzyme is involved in carbohydrate metabolism and has been used as an indicative criterion of exposure to chemical stress. LDH is a parameter widely used in toxicology and clinical chemistry to diagnose all the tissues and organ damage.

**MATERIALS AND METHODS**

Livining specimen of *Labeo rohita* were collected from local freshwater 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 96 hrs. (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 was used to calculate the significance of data.

**RESULTS AND DISCUSSION**

The present study reveals a significant increase in the lactic dehydrogenase activity in the blood of *Labeo rohita* under the stress of metanil yellow and bismark brown. The increase was ±12.39%, ±22.15%, ±34.77%, ±55.37% at acute exposure (T1 and T2), and chronic exposure (T3 and T4) in response to metanil yellow. Similarly the increase was ±16.59%, ±26.69%, ±46.74% and ±68.49% in response to bismark brown at acute (T1 and T2) and chronic (T3 and T4) exposures respectively. All these elevations were statistically highly significant (P< 0.01) Table 1.

Lactic dehydrogenase is an enzyme which is considered most important in tissue respiration. LDH enzyme is used in inter conversion of pyruvic acid to lactic acid. It acts as a pivotal enzyme between the glycolytic pathway and the tri carboxylic acid cycle.

Elevated activity was seen in liver, kidney and blood of *Heteropneustes fossilis* when exposed to zinc and metanil 

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**Received:** 29-03-2014

**Accepted:** 22-04-2014
Table 1. Alteration in the activity of lactic dehydrogenase (LDH) enzyme induced by metanil yellow and bismark brown in the blood of *Labeo rohita*.

<table>
<thead>
<tr>
<th>DYES</th>
<th>C</th>
<th>T1</th>
<th>T2</th>
<th>T3</th>
<th>T4</th>
</tr>
</thead>
<tbody>
<tr>
<td>4’AASA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>+1.732</td>
<td>+1.106</td>
<td>+1.424</td>
<td>+1.947</td>
<td>+2.461</td>
</tr>
<tr>
<td></td>
<td>(12.39%)</td>
<td>(22.15%)</td>
<td>(34.77%)</td>
<td>(55.37%)</td>
<td></td>
</tr>
<tr>
<td>DAAB</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>+1.732</td>
<td>+1.231</td>
<td>+1.424</td>
<td>+1.424</td>
<td>+2.461</td>
</tr>
<tr>
<td></td>
<td>(16.59%)</td>
<td>(26.69%)</td>
<td>(46.74%)</td>
<td>(68.49%)</td>
<td></td>
</tr>
</tbody>
</table>

Values are mean ± S. E. of nine observations each.

4’AASA— Metanil yellow T1-48 Hrs T3---15 Days
DAAB— Bismark brown T2-96 Hrs T4-30 Days C---- Control.

yellow. Increased LDH activity was found in brain, liver, gills and intestine of *Colisa fasciatus* after chrysophene-G and direct deep black exposure. An increased enzymatic activity was reported in the liver of *Clarias batrachus* in response to congo red and bismark brown intoxication.

Muscle LDH activity increased in *Heteropneustes fossilis* due to zinc and chromium intoxication. Increased LDH activity was found in liver, kidney and gills of *Clarias batrachus* under the stress of congo red and bismark brown. LDH increase was seen in *Clarias gariepinus* collected from six sites along the river Nile. LDH activity increased after 96 hrs. exposure at 16°C water temperature in muscles, liver, gonadal and nervous tissues of *Colisa fasciatus* when exposed to cypermethrin. Elevated LDH activity was reported in different tissues of *Labeo rohita* when exposed to cypermethrin.

An increase in LDH activity was observed in liver of *Oreochromis mossambicus* in presence of sublethal concentration of mercury and zinc. Increased LDH activity was seen in *Tilapia mossambica* under the stress of sumithion.

However decrease in LDH activity was reported following sub lethal and lethal exposures of endosulfan and fenvalerate in brain, gills, liver and muscles after 24 hrs. and 15 days exposure of *Labeo rohita*. LDH activity decreased in brain, liver and skeletal muscles of *Clarias batrachus* after 21 days exposure of endosulfan. 30% decrease in muscles, 77% decrease in liver and 77% to 91% decrease in gonads in LDH activity was found in *Channa punctatus* when treated with stem bark extract of *Croton jiglium* of family Euphorbiaceae. LDH activity also decreased in muscles, liver, brain and blood of *Labeo rohita* due to exposure of hexavalent chromium. 69% decrease in LDH activity in the liver of *Tor putitor* shows adverse effect of aquatic pollution on fish health. Serum LDH decreased in *Cyprinus carpio* under the impact of curacron. Lactic dehydrogenase catalyses the conversion of pyruvic acid to lactic acid in an anaerobic conditions. The increase in tue activity of LDH indicates increased anaerobic catabolism of substrate rather its entering the oxidative break down cycle. This also indicates the physiological stress that the fish is facing upon the exposure of metanil yellow and bismark brown. The diversion towards anaerobiosis might be expected since in stress conditions some extra amount of energy is needed to mitigate the stress and the elevated glycolysis.

REFERENCES


