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Short Communication

Impact of Leather Dyes on Total Protein of Fresh Water Teleost, *Cirrhinus mrigala* (Ham.).

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Abstract : The present investigation shows that the serum total protein activity shows decreasing trend on exposure to Bismarck brown and Acid leather brown at different time intervals (24 hrs, 48 hrs, 96 hrs and 1 week) and at all three concentrations (0.6 mg/l, 0.7 mg/l, 0.8 mg/l, 8 mg/l, 9 mg/l and 10 mg/l). However the effect was more with acid leather brown than Bismarck brown. The decrement in total protein may be due to total protein treatment in attribute to abnormalities in fat deposit cell of serum and this disturbing the protein metabolism.

Key words : Total protein, Leather Dyes, Decrease, *Cirrhinus mrigala*, Abnormalities, Metabolism.

Introduction

The use of dyes dates as for back as prehistoric man, but the synthetic dye industry began in 1856 when William H- Perkin synthesized the dye, since that time the synthetic dye industry has grown extensively in the United States as well as in other countries. The dye stuffs industry in India is a post independent phenomenon, after 1952; a few large units were set up for rapid growth in 1990, there are more than 2,500 tanneries located in different urban centers. The various types of dyes are used in tanning the leather so as to improve its appearances and make it worthy for sale in finished form. The effluents of dyes in inland waters from tanneries, textiles mills and paper mills produce tremendous chemical stress on aquatic organisms including fishes and turtles resulting in their mass mortality. The dyes have also been reported to precipitate in aquatic organism leading to used hematological changes and histopathological alterations in vital organs in fishes. The dye effluents so generated from the industries and ultimately dumped in natural waters from one of the major thrust areas of water pollution severely affecting the fish fauna.

Materials and Method

The fishes *Cirrhinus mrigala* (Ham.) were obtained from the Govt. fish form Laremada Agra. The freshly captured fishes were brought to the laboratory and were kept in running tap water for about an hour, each fish was measured, weighed and identified for sex. The total protein in serum was estimated by the method of Lowery *et al* (1951). The appearance of the blue colour is the result of biuret reactions of protein with copper ion in the alkaline medium and the reduction of phosphomolybdic, phosphotungstic reagent by the tyrosine and tryphlophane present in the treated protein.

Reagents

(i) 10% of trichloroacetic acid.

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(ii) N-NaoH: 4.0 gm of sodium hydroxide was dissolved in 100 ml of distilled water.

(iii) Lowry's solution : the Lowry's solution was prepared by mixing 50 ml of 2% sodium carbonate, 0.5 ml of 1% copper sulphate and 0.5% of sodium tartarate, half an hour before use.

(iv) Folin phenol reagent

The Serum was homogenized in distilled water (5 ml) that was taken in centrifuge tube and then equal volume 0.5 ml of 10% TAC (Trichloroacetic acid) was added to the homogenate was added. The contents of the tube were centrifuged at 2000 rpm for about 15 minutes then supernatant discarded and precipitate was washed thrice, first with 1.0 ml of 5% trichloroacetic acid and then twice with 1.0 ml of distilled water. Now after washed carefully, it was used for the estimation of protein. The precipitate (vide supra) was dissolved in 4.0 ml of N-NaoH and allowed to stand in a water boiling bath at 60-70^{o} C for about 10 minutes, 0.55 ml of this solution was taken in a test tube and to it 4.5 ml of Lowry's solution and 0.55 ml of folin phenol reagent was added. The contents were thoroughly mixed and allowed to stand for about 10 minutes for the colour development. The optical density of which was measured colorimetrically at 620 nm (used red filter) against the distilled water used as "Blank". The total protein in the serum was calculated with the help of the standard curve and the result, were expressed in µg/dl serum.

Results and Discussion

The freshwater major carp were treated with two leather dyes Bismerck Brown and Acid leather at different time intervals at three different concentrations. After Bismarck brown treatment (as in Table 1) at 0.6 mg/l the value of total protein was 205.56± 1.67 mg/l in control set while the values of total protein were 203.11 ± 1.04, 201.26 ± 0.98, 200.00 ± 0.56 and 185.65 ± 0.09 mg/dl after 24 hrs, 48 hrs, 96 hrs and 1 week treatment, respectively the increase was significant after 24 hrs, 48 hrs, 96 hrs and 1 week treatment. The value of total protein was 205.16 ± 2.60 mg/dl, in control set after 0.7mg/l whereas as the value of total protein were 203.31 ± 1.12, 201.06 ± 0.90, 199.50 ± 0.46 and 180.60 ± 0.08 mg/dl after 24 hrs, 48 hrs, 96 hrs and 1 week treatment, respectively; the increase was significant after 24 hrs, 48 hrs, 96 hrs and 1 week treatment, respectively where as the value of total protein was 204.52 ± 0.64 mg/dl in control set after 0.8 mg/dl treatment. The values of total protein were 202. 10 ± 1.04 , 198. 40 ± 0.17, 193.44 ± 0.52 and 178.15 ±0.06 mg/dl after 24 hrs, 48 hrs, 96 hrs, and 1 week treatment, respectively; the increase was significant after 24 hrs, 48 hrs, 96 hrs and 1 week treatment.

Table 1 : Total protein (mg/dl) in *Cirrhinus mrigala* (Ham.) after Bismarck brown treatment

Conc.	Control Mean ± S.Em.)	24 hrs (Mean ± S.Em.)	48 hrs. (Mean ± S.Em)	96 hrs. (Mean ± S.Em.)	1 week. (Mean ± S.Em).
0.6 mg/L	205.56± 1.67	203.11 ± 1.04*	201.26± 0.98**	200.00± 0.65 **	185.65± 0.09 ****
0.7 mg/L	205.16 ± 2.60	203.31± 1.12*	201.06± 0,90**	199.65± 0.46***	180.60± 0.08 ****
0.8 mg/L	204.52± 0.46	202.10± 1,04*	198.40± 0.17 ***	193.44± 0.52 ****	178.15± 0.06 ****

* Non significant (P>0.05); **Significant (P<0.05); ***Highly significant (P<0.01); ****Very highly significant (P<0.001)

Table 2 : Total protein (mg/dl) in *Cirrhinus mrigala* (Ham.) after treatment Acid leather brown

Conc.	Control Mean ± S.Em.)	24 hrs (Mean ± S.Em.)	48 hrs. (Mean ± S.Em)	96 hrs. (Mean ± S.Em.)	1 week. (Mean ± S.Em).
8 mg/L	205.56± 1.67	203.32± 1.06*	201.67± 0.18**	200.04± 0.50 **	186.60± 0.08****
9 mg/L	205.16 ± 2.60	203.56± 1.02*	201.10± 0.57 *	199.79± 0.46***	181.64± 0.08****
10 mg/L	204.52 ± 0.64	202.50± 1.12*	198.99± 0.10 ***	194.68± 0.62 **	179.25± 0.16 ****

* Non significant (P>0.05); **Significant (P<0.05); ***Highly significant (P<0.01); ****Very highly significant (P<0.001)

After treatment with Acid leather brown the value of total protein (as in Table 2) was 205.56 ± 0.67 mg/dl in control set after 8 mg/l while as the value of total protein was 203.32 ± 1.06, 201.07 ± 0.18, 200.04 ± 0.50 and 186.60 ± 0.08 mg/dl after 24 hrs, 48 hrs, 96 hrs and 1 week treatment; the increase was significant after 24 hrs, 48 hrs, 96 hrs and 1 week treatment; the value of total protein was 205.16 ± 2.60 mg/dl in control set after 9 mg/l where as the values of total protein were 203.56 ± 1.02, 201.10 ± 0.57, 1.99.79± 0.46 and 181.64 ± 0.08 mg/dl treatment, respectively; and the increase was significant after 24 hrs, 48 hrs, 96 hrs, and 1 week treatment. After treated with 10 mg/l the values of total protein at control set was 204.52 ± 0.64 mg/dl. Where as the values of total protein were 202.50 ± 1.12, 198.99 ± 0.10, 194.68 ± 0.62, and 179.25 ± 0.16 mg/dl after 24 hrs, 48 hrs, 96 hrs, and 1 week treatment; the increase was significant after 24 hrs, 48 hrs, 96 hrs, 1 week treatment, receptivity. The serum total protein activity showed decreasing trend on exposure to Bismarck brown and Acid leather brown at different time intervals (24 hrs, 48 hrs, 96 hrs and 1 week) at all the three concentrations. However, the effect was more with acid leather brown exposure than Bismarck brown. The decrement in total protein may be due at total protein treatment in attribute to abnormalities in fat deposit cell of serum and this disturbing the protein metabolism. Further, Singh and Bhati (1994) evaluated the toxic effect of 2,4-D intoxication in *Channa punctatus* and found that the sub lethal concentration prompted a decrease in protein content (Sivaramakrishna and Redhakrisha, 1998) and as reported in *Cyprinus carpio* (Balasubramaniam *et al*, 1999). In *Oreochromis mossambicus* under ambient areas stress, Kahre *et al*. (2008) observed in *Clarias batrachus* exposed to malathion. Gautum and Gautum (2001) also observed marked decrease in proteins in gastrointestinal treat of *Channa punctatus*. Rani *et al*. (2001) observed in *Tilapia mossambuca*, Desai (2002) recorded in *Channa punctatus* after nickel administration, and so by Shanthi *et al.* (2005) in *Cyprinus carpio*, by Radha *et al*. (2005) in *Cyprinus carpio* and by Shukla *et al*. (2007) in *Channa punctatus*. Depletion of total protein in *Leabo rohita* and *Cirrhinus mrigala* are also observed by David *et al*. (2003) in malathion toxicity in *Catla catla*.

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