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Effect of Leather Dyes on Packed Cell Volume of Fresh Water Teleost *Cirrhinus mrigala* (Ham.)

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Abstract : The Subleathal toxicity of two leather dyes Bismarck brown and acid leather brown on packed cell volume was investigated on fresh water teleost fish *Cirrhinus mrigala* (Ham.) at different time intervals (24 hours, 48 hours, 96 hours and 1 week) decreasing trend was observed in Packed cell volume. However the effect was more with acid leather brown exposure than bismarck brown.

Key words : Leather dyes, *Cirrhinus mrigala*, PVC.

Introduction

There are more than 2,500 tanneries located in different urban centers . Today, the tanning industry in the country has an installed capacity of over 225 million pieces of hides and skins, where as, the estimated availability of hides at present is 34 million pieces and of skins 17.4 million pieces per annum. Tanning and finishing industry in India is concentrated in Madras, Ran pat, Amber, Vaniambari, Erode, Dindigul, Permabut, Kanpur, Agra, Calcutta, Mumbai, etc. Tamilnadu accounts for tanning and finishing of over 60 percent of the hides of skins available in the country and Kanpur, Agra and Calcutta together accounts for 20.25 percent. The Indian leather is exported in the form of finished leather, leather footwear, footwear components, and leather garments and leather goods. The industry has, now, have the distinction of being the fourth largest foreign exchange earner for the country. According to the latest information the present export for leather garments has reached to a height worth 421 millions by 21st century.

Methods

Fishes *Cirrhinus mrigala* (Ham.) were obtained from the Govt. fish farm Laramada (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 packed cell volume or haematocrit value expresses the percentage sample occupied by the erythrocytes. It was determined by Wintrobe (1968).When a test tube is filled with the blood and centrifuged, the red cells are thrown to the bottom, while the space they occupy becomes a constant volume, which will be minimally decreased after further prolonged centrifugation. The Wintrobe's tube was filled with blood up to mark 100 mm with the help of a fine glass dropper and centrifuged at 3000 rpm for half an hour. After centrifugation the upper level of red cellular layer in Wintrobe's tube was noted as packed cell volume or haematocrit value in percent.

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Calculation

$$PVC\ (\%) = \frac{\text{Length of the red blood cells column}}{\text{Length of the whole blood column}} \times 100$$

Results and Discussion

After Bismarck Brown Treatment

The treatment was given at three concentrations for different hours as 0.6mg/l, 0.7 mg/l and 0.8 mg/l as in table one. The value of packed cell volume was 46.02+1.92 % in control set after 0.6 mg/l, value of packed cell volume was 44.49+1.03, 42.71+1.22, 37.42+1.11 and 29.61+0.09 % after 24 hrs, 48 hrs, 96 hrs and 1 week treatment, increase was significant after 24 hrs, 48 hrs, 96 hrs and 1 week treatment respectively while as value of packed cell volume was 45.01+1.90 % in control set after 0.7 mg/l, value of packed cell volume was 43.39+1.07, 41.76+1.12, 36.32+1.01 and 29.91+0.19 % after 24 hrs, 48 hrs, 96 hrs and 1 week treatment, increase was significant after 24 hrs, 48 hrs, 96 hrs and 1 week treatment respectively. The value of packed cell volume was 46.91+1.82 % in control set after 0.8 mg/l, value of packed cell volume was 44.12+0.91, 43.11+1.20, 36.42+1.21 and 28.11+0.19 % after 24 hrs, 48 hrs, 96 hrs and 1 week treatment, increase was significant after 24 hrs, 48 hrs, 96 hrs and 1 week treatment respectively.

After acid leather brown treatment

The treatment was given at three concentrations for different hours as 8 mg/l, 9 mg/l and 10 mg/l as in table 2. The value of packed cell volume was 46.02+1.92 % in control set after 8 mg/l, value of packed cell volume was 45.00+1.02, 42.95+0.22, 38.42+1.10 and 31.81+0.09 % after 24 hrs, 48 hrs, 96 hrs and 1 week treatment, increase was significant after 24 hrs, 48 hrs, 96 hrs and 1 week treatment respectively, while as value of packed cell volume was 45.01+1.90 % in control set after 9 mg/l, value of packed cell volume was 44.33+1.17, 41.99+1.10, 37.30+0.91 and 30.99+0.20 % after 24 hrs, 48 hrs, 96 hrs and 1 week treatment, increase was significant after 24 hrs, 48 hrs, 96 hrs and 1 week treatment respectively. The value of packed cell volume was 46.91+1.82 % in control set after 10 mg/l, value of packed cell volume was 44.59+0.91, 43.99+1.20, 37.00+2.31 and 31.10+0.98 % after 24 hrs, 48 hrs, 96 hrs and 1 week treatment, increase was significant after 24 hrs, 48 hrs, 96 hrs and 1 week treatment respectively. In *Cirrhinus mrigala* (Ham.), decreasing trend in PCV 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 has been observed. However, the effect was more in acid leather brown exposure. The reduction in PCV has also been observed by Mishra and Shrivastava (1979) in Colisa fasciatus due to zinc sulphate; in *Heteropneustes fossilis* due to manganese (Garg and Tyagi, 1989); in *Heteropneustes fossilis* due to propoxur intoxication (Singh and Shrivastava, 1991); in *Heteropneustes fossilis* due to potash poisoning (Mishra *et al*., 1995); in *Heteropneustes fossilis* treated with devithion (Nath and Banerjee, 1995); in *Channa punctatus* due to copper sulphate and potassium dichromate poisoning respectively (Singh, 1995); in *Heteropneustes fossilis* due to aldrin and fenvalerate intoxication (Thakur and Bais, 2000); in *Cyprinus carpio* (Dhanapakin and Ramaswamy, 2001); in *Heteropneustes fossilis* exposed to washing effluents (Gupta *et al*., 2001); in *Oreochromis mossambicus* exposed to copper and zinc mixture (Nussy *et al*., 2002); after endosulphan intoxication in *Clarias batrachus* (Tripathi and Verma, 2004); in *Labeo rohita* (Acharya *et al*., 2005) and in *Cyprinus carpio* (Johal *et al*., 2007) respectively.

In the present study the Bismarck brown and acid leather brown toxicity results into significant decrease in the PCV. The reduction in PCV may be correlated with reduced cell

Table 1 : PCV. (%) in *Cirrhinus mrigala* (Ham.) after bismarck brown treatment

Conc.	Control (Mean+ S.E m.)	24 hrs (Mean+ S.E m.)	48 hrs (Mean+ S.E m.)	96 hrs (Mean+ S.Em.)	1 week (Mean+ S.Em.)
0.6 mg/L	46.02+1.92	44.49+1.03*	42.71+1.22**	37.42+1.11**	29.61+0.09***
0.7 mg/L	45.01+1.90	43.39+1.07**	41.76+1.12**	36.32+1.01**	29.91+0.19****
0.8 mg/L	46.91+1.82	44.12+0.91*	43.11+1.20**	36.42+1.21***	28.11+0.19***

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

Table 2 : PCV (%) in *Cirrhinus mrigala* (Ham.) after acid leather brown treatment

Conc.	Control (Mean+ S.E m.)	24 hrs (Mean+ S.E m.)	48 hrs (Mean+ S.E m.)	96 hrs (Mean+ S.Em.)	1 week (Mean+ S.Em.)
8 mg/L	46.02+1.92	45.00+1.02*	42.95+0.22**	38.42+1.10**	31.81+0.09***
9 mg/L	45.01+1.90	44.33+1.17**	41.99+1.10**	37.30+0.91**	30.99+0.20***
10 mg/L	46.91+1.82	44.59+0.91*	43.99+1.20*	37.00+2.31**	31.10+0.98***

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

counts and haemoglobin concentration. Leather dyes (Bismarck brown and acid leather brown) administration reduces erythropoiesis, which in turn induces anaemia (PCV decreases in anaemia).

In contradiction, Dhanekar *et al*. (1985) reported an increase in the PCV in *Heteropneustes fossilis* and *Channa punctatus* due to zinc toxicity.

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