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ORIGINAL ARTICLE

Long Term Photoperiodic Effect of Fresh Water Fish *Channa punctatus*

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ABSTRACT

The objective of this study was to evaluate the effect of photoperiodic locomotor activity & growth development in (Channa punctatus) finger lings. A completely randomised design was used, with three treatment(OL:24D, 62:18D, 12L;12D) and two replicates with the aquarium as the experimental unit. Whereas those under 62;18D and lowest activity fish subjected to a photoperiod of 6L:18D and 12L:12D showed the highest levels of performance. The effect of constant light on the blood of Channa punctatus exhibited a general deviation in RBC count of blood urea haemoglobin percentage, blood sugar, bilirubin, alkaline phosphate & serum transmission. While the levels of cholesterol & serum protein values were depleted.

Key words: *Feed intake, Fish, Locomotor rhythm*

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INTRODUCTION

The influence of environmental factors on fish has taken well studied, especially those related to effects on reproduction & growth (Boeuf & Bail, 1999). Among these factors, photoperiod acts as a synchroniser of the endogenous rhythm, influencing locomotors activity, growth, metabolic rate, body pigmentation, sexual maturation & reproduction of teleost fish (Boeuf & Bart, 1999, Biswas *et.al.*, 2002; El-saye & Kawanna, 2004). For some species long photoperiods might indirectly modify growth by electing an increased feed intake, developing muscle mass through increased locomotor activity Boef & Bail, 1999), enhancing nutrient use efficiency (Biswas *et.al.*, 2006) and for redirecting energy from gonadal development into somatic growth (Bowef & Bail, 1999; Red *et.al.*, 2006).

Light plays in important role in the biology of fishes. The changs in photoperiod affects the activity of various physiological activities such as spawning, migration, swimming etc. The light acts as a sort of stress factor and the hormomal regulation as well as enzymatic activity in the body of fish is changed. But very little is known abut its hematological complications. The present investigation shows the effect of stress on certain haemotological parameters such as R.B.C. count, haemoglobin percentage, blood sugar, cholesterol, blood urea, total proteins, bilirubin, alkaline phosphate and both the serum transaminases (SGOT & SGPT) in Clarias batrachs (Linn), together with recovery.

MATERIALS AND METHODS

Fishes were arranged from local fish catchers of Distt. Manipuri, who had collected them from lakes and ponds in the area. These were treated with 0.2% $KMnO_4$ solution to remove any dermal infection and were acclimatized for a week before transferring them to the experimental aquaria. They were divided into 8 sets of 12 fishes in each aquarium. Four sets were treated as control and the remaining four as experimental. The experimental sets were kept in constant light flooded with electric lamps. One set was scarified after 24 hr and another set after 5 days and the remaining two sets were allowed for the recovery during which the photoperiod was maintained as 12hr darkness & 12 hr in light. The fishes allowed for recovery work sacrificed. after 24 hr and 5 days separately. The blood was collected from the heart and EDTA was used as an anticoagulant. The R.B.C. count and haemoglobin percentage was determined by Dacie & Lewis (1975). The estimation of blood sugar was done by Ortho-toluidine method of Cooper & Daniel (1970) and Cholesterol was estimated by Zak & Epstien (1961). The blood urea was determined by Diacetyl monoxine method (Kaplan & Teng, 1976) and the total protein was done by the method suggested by Henry *et.al.,* (1956). Estimation of serum glutamic oxalacetic transaminase (SGOT) and serum glutamic pyruvic transminase (SGPT) were determined by the method of King (1958) and serum bilirubin was done by the method of Zak & Epstien (1961) whereas alkaline phosphatase was determined by Wooton (1964).

RESULTS AND DISCUSSION

In some species, the increase in photoperiod & temperature led to rapid increases in GH & IGF-1, which are particularly potent stimulators of muscle growth (Taylor & Miigaud 2009). According to Taylor, *et.al.* (2005) Juvenile ranibow trout (Oncorhynchus mykiss) subjected to a long photoperiod (18C; 6D) demonstrate a direct stimulation in growth the due to increased Plasma levels of IGF1 compared with fish subjected to natural photoperiod or a 6L:18D photoperiod.

The fishes were found comparatively more active in light and swam rapidly. The rate of food consumption in experimental sets was higher than the control sets and the skin because pale in colour. The various hematological values have been presented in the Table 1. The active swimming indicate elevated levels of serotonin in the brain which increase the metabolism in the experimental animal. As such the food consumption also increased in the test fish. The pale colour of the skin indicates decreased secretion of melatonin from the pineal in light which causes dispersal of chromatophores.

Table 1: Light stress on haematology of *C. punctatus* at various intervals and recovery

Parameters	Control	Effect / Recovery	
		24 hr	5 days
R.B.C. ($10^4/mm^3$)	3.02±0.06	4.50±0.12 3.28±0.15	4.62±0.11 3.08±0.01
Haemoglobn (gm%)	14.80±0.16	18.00±0.20 15.50±0.10	18.20±0.15 15.50±0.10
Blood Sugar (mg/dl)	57.00±1.58	76.80±.40 67.00±1.50	78.20±1.50 59.00±2.00
Cholesterol (gm/dl)	400.00±15.81	350.00±8.20 360.00±14.20	310.00±11.70 380.00±11.50
Blood urea (mg/dl)	6.00±0.32	10.00±0.20 12.50±0.40	13.10±0.20 9.00±0.60
Total protein (gm/dl)	8.00±0.16	6.20±0.12 7.23±0.10	6.00±0.30 7.75±0.11
Bilirubin (gm/dl)	3.00±0.15	3.60±0.14 3.40±0.12	3.80±0.08 3.20±0.18
Alkaline phosphatase (KA units)	29.00±0.79	41.80±2.30 61.50±6.80	74.20±1.50 34.50±2.40
S.G.O.T. (IU/L)	65.00±1.58	65.00±1.40 64.00±0.40	66.00±1.40 64.00±0.50
S.G.P.T. (IU/L)	78.00±1.58	78.00±1.30 79.00±1.20	81.00±1.20 77.00±0.40

Values are mean ± S.D.

During the present investigation the R.B.C. count, blood urea, haemoglobin percentage, blood sugar, bilirubin, alkaline phophatase and serum transaminases were found elevated while the cholesterol and total serum protein value were depleted. Hoar & Eales (1963) opined that the elevation of R.B.C. might be due to hypersecretion of pituitary. The pituitary hypertrophy results into increased oxygen consumption and the locomotory activities in fishes. The higher metabolic activity is also the ultimate cause of elevated level of haemoglobin which was also confirmed in the observations made by Pandey & Munshi (1976) in *Heteropneistes fossils* (Bl). The hyperglycemia indicates the transformation of liver glycogen to blood glucose. The depletion in cholesterol in serum is due to its utilization in synthesis of vitamin D and various other steroids whereas the elevation in blood urea in serum is due to increased secretion of ADH from pituitary which inhibits the excretion of urea. Brett (1972 reported the elevated levels of both the serum transaminases (SGOT & SGPT) due to hyperactivity of the pituitary and the thyroid under light stress. The elevation of alkaline phosphatases may be due to increased locomotory activity of fishes (Beitinger, 1975) and the causes of restlessness may be assigned to increased activity of thyroxine under the extended photoperiod.

During recovery the alkaline phosphatase value started to normalize but was still far off from the control value even after 5 days. The serum transaminase values were almost restored, which is possibly due to resumed normal metabolic activities as well as endocrine coordination. The total protein, cholesterol and blood sugar reached almost normal level within a period of 24hr to 5 days and the value of bilirubin came down to normal but slightly above the control value. However, the blood urea sharply elevated and did not come to normal level even after 5 days. The R.B.C. count and haemoglobin concentration were also restored to normal condition within 5 days.

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