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Effect of constant light and dark on Packed Cell Volume in Clarias batrachus

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Abstract: *Present study was aimed to examine the effect of constant light (LL) and constant dark (DD) on packed cell volume (PCV) in Indian fresh water cat fish, Clarias batrachus. Following acclimation, animals were divided into three groups and maintained under different photoperiods i.e., natural day length (control), continuous light (LL) and continuous dark (DD) for 60 days. Experiments were carried out during different phases of annual reproductive cycle of C. batrachus i.e., pre spawning, spawning and post spawning phases for three consecutive years. During each experimental protocol, four animals from each group were examined at every 15 days to observe changes occurring in the hematological studies including packed cell volume (PCV). Four way ANOVA was employed to examine the effect of factors, "Year"(1,2 and 3), "Phase"(Resting, pre spawning, spawning and post spawning phases), "Treatment"(LD=Normal Day-night condition, LL=Continuous illumination and DD=continuous dark condition)) and "Interval"(15 days,30days,45days and 60 days) on Packed Cell Volume (PCV) of Clarias batrachus. Lowest value of haematocrit recorded in Group I in compression of Group II and Group III. While the correlated study reveals highest value of PCV in group III. All the parameters except year produce significant effect on Packed Cell Volume (PCV) of Clarias batrachus (p<0.001).Factor year showed no significant effect on Packed Cell Volume PCV (p<0.05). It could be suggested that exposure under DD may be a stress condition for the fish, C. batrachus specially during its high energy demanding phases like prespawning and spawning phases.*

Key words: *Clarias batrachus, photo period, stress, packed cell volume and hematology.*

I. Introduction

Fishes are particularly useful organism to utilize in bridging the gap between behavior and physiology. Fish comprise the most species vertebrate order with over 25,000 species and an unrivaled diversity in life history patterns breeding system, sensory system as well as environment requirement. Hence fish provides an almost endless test bed for either single species studies or comparative analysis of link between behavior and physiology (Katherine et al.,2006). Haematological parameters have been recognized as valuable tools for monitoring the fish health and effect of environment changes on fish biology(Wells, 1999; Bhaskar and Rao, 1984, Schuett et al., 1997) it is also used for health status and stress indicator in fish (Valenzuela et al., 2006).

Blaxhall and Daisely (1973) have reported the possibility of using haematocrit as a tool in aquaculture. Jawad ,L.A. (2004), worked on Indian shad Tenualosa ilisha he concluded that two factors are probably responsible for the rise in Haematocrit value (A) Environmental factors (B) Physiological factors.

Wang et al., (1994); Pierson et al., (2004) has observed increased PCV under stressful conditions whereas Graham, (1997), is of the openion that changes in PCV is related to environmental factors such as water temperature and salinity.

Murachi (1959) found that haematocrit increased as the fish length increased. Similar results were obtained for Clarius batrachus (Joshi and Tandon, 1977).

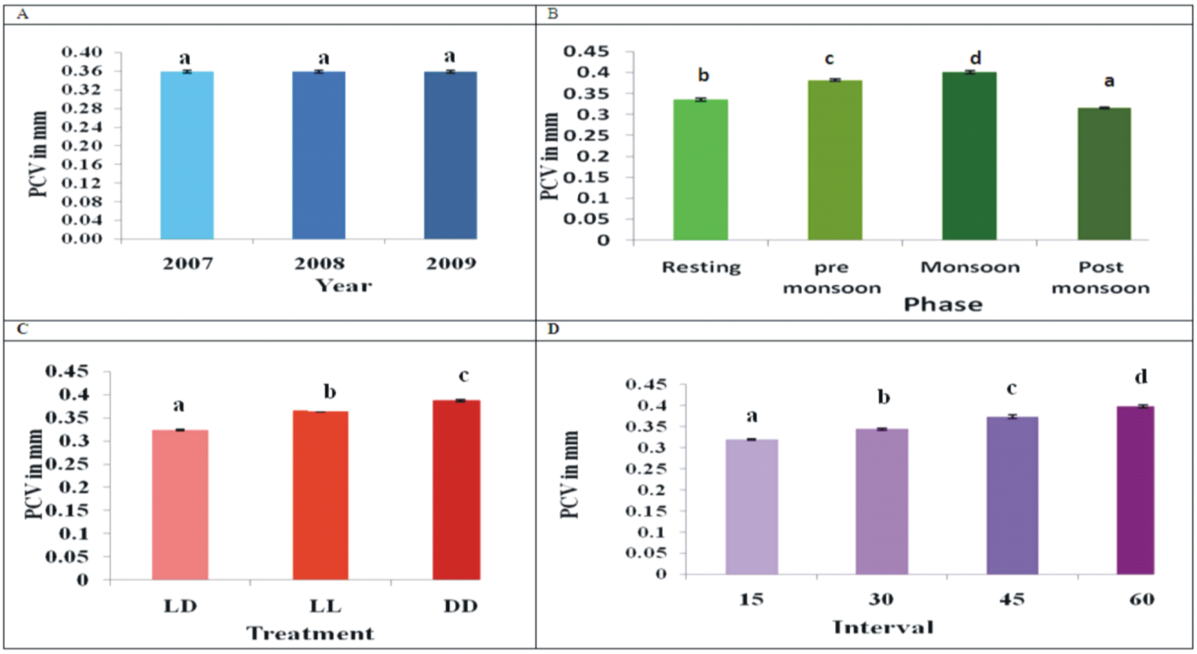
II. Material And Methods

Live Clarias batrachus of mixed sex (body weight 70 ±gm) were procured from the local fish market during different phases (pre spawning, spawning and post spawning) of its annual reproductive cycle. During each phase, prior to start the experiment animals were kept in stock aquaria for proper acclimation.

Following acclimation, animals were divided into three groups (n=18 in each group) and maintained under different photoperiods i.e., natural day length (control), continuous light (LL) and continuous dark (DD) for 60 days. Experiments were carried out for three consecutive years. During each experimental protocol, four animals from each group were taken out successively in every 15 days and PCV is calculated by standred Wintrobe's heamatocrit methodology, during experiment water inside the aquaria was renewed every alternate day and animals were fed ad labium.

III. Results And Discussion

Graphical presentation for different four factor's on Packed Cell Volume in C.batrachus



A. Packed Cell Volume in C.batrachus at different year.

B. Packed Cell Volume in C.batrachus at different phases.

C. Packed Cell Volume in C.batrachus at different treatment condition.

D. Packed Cell Volume in C.batrachus at different time interval.

Completely randomized ANOVA was employed to examine the effect of factors, "Year" "(I,II and III), "Phase"(Resting, Pre spawning, spawning and Post spawning), "Treatment"(LD=Normal Day-night condition, LL=Continuous illumination and DD= continuous dark condition)) and "Interval"(15 days,30days,45days and 60 days) on Packed Cell Volume (PCV) of Clarias batrachus. All the parameters except year produce significant effect on Packed Cell Volume (PCV) of Clarias batrachus ($p<0.001$). Factor year showed no significant effect on Packed Cell Volume PCV ($p<0.05$).

Interaction of these factors as phase and treatment ; phase and interval; treatment and interval; and phase, treatment and interval were also found to be significant effect on Packed Cell Volume (PCV) of Clarias batrachus ($F1152=152$, $p<0.001$). Interaction effect between year and phase; and year, phase, treatment were found less significant ($F1152=152$, $p<0.01$), whereas interaction effect of year and treatment; year and interval; and year, phase, treatment and interval were found not to be significant ($F1152=152$, $p<0.05$). Result of Duncan's multiple range test followed by ANOVA for Packed Cell Volume (PCV) are presented in figure(2).

Duncan's showed significantly lowest value in post spawning phase and it was higher in resting phase. Result of treatment significantly lower in LD condition and higher in DD condition. Duncan's showed significantly lowest value in 15 days interval and were higher in 60 days.

Many worker worked on PCV value on many species of fishes to saw the various kind of effect like thermal, seasonal, stress and routine variation and provide the data like Jawed et al., (2004) and Travis et al., (2007) etc. Recently some worker has been seen the effect of various photoperiod on haematocrit value of different species in different area like Valenzuela et al., (2006,2007), Biswas et al., (2004); Ali Bano (2009); Srivastava and choudhari (2010).

Haws and Goodnite (1962) reported the seasonal variation of haematocrit value in two cat fishes I. nolulosus and I. puctatus where ranging between 15.0-

47.0%, which was in support of the present study of heamatocrit value. According to Bouef and Bail (1999) photoperiod is a factor which caused stressed in fishes, Pierson et al., (2004) showed by their work that haematocrit value has been increased under stress full condition. Biswas et al., (2004) resulted that fish Nile tilapia did not showed any changes in haematocrit value under various photoperiod . Similar result also reported by Ali Bani (2009) in fish great sturgeon Huso huso . Haematocrit value is also related with haemoglobin percentage.Jawad et al., (2004) reported that environmental factor affected all haematolocical parameters along with haematocrite value through haemoglobin. This statement supports present findings that Group III showed high haemoglobin percentage and raised haematocrit value.

Blood parameter haematocrit value in fish increases during spawing period Joshi and Tandon (1977), and Leonard and Mc Cromic (1999) which is might be because of high energy requirement during this phase this statement supports present study. Siddiqui and Naseem (1978) worked on two fresh water teleost fish Cirhina mrigla and Labio rohita and concluded the similar result.

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