Haemato-Biochemical Parameters of Common Carp

Ulfat Jan, G. Mustafa Shah and Aijaz Ahmad Bhat

Post Graduate Department of Zoology, University of Kashmir Srinagar – 190006.
aijazafzal@gmail.com

Abstract: During the present study an attempt has been made to assess the seasonal variation of Hemato-biochemical parameters of common carp in Kashmir. During the study 147 specimens were analysed.The results of standard deviation observed on RBC's and WBC's during winter, spring, summer, and winter were 0.1595, 0.232, 7.479, and 0.2094 and for WBC's were , 6.483, 5.815, 0.2618 and 5.090.The P. value is <0.0001 extremely significant. Variation among column means is significantly greater than expected by chance. The glucose concen. Observed during winter, spring, summer, and winter were 3.579, 5.265, 8.426 and 11.156.The P.Value for glucose is <0.0001. Considered extremely significant. Variation among column means is significantly greater than expected by chance. The Plasma osmolarity observed during winter, spring, summer, and autumn were 0.3917, 0.4626, 1.134, and 1.933.The P.value is <0.0001 considered extremely significant .Variation among column means is significantly greater than expected.
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Key words. RBC's, WBC's, Glucose, Plasma Osmolarity**.**

Introduction:

Common carp (*Cyprinus carpio*) was introduced in Kashmir valley (Das and Subla 1956). Common carp is hardy and tolerant of a wide variety of conditions but generally favour large water bodies with slow flowing or standing water and soft bottom sediments. Carp occur at a temperature of 3-35^{o}C, and thrive in large turbid rivers. They are omnivorous feeding mainly on aquatic insects, crustacean's annelids, mollusks, Weed and tree seeds, wild rice, aquatic plants and algae, mainly by grubbing in sediments, spawn in spring and summer, laying sticky eggs in shallow vegetation. A female 47-cm in length produces about 300,000 eggs. Young are probably preyed upon by northern pike, Muskellinge and large mouth bass. Adults uproot and destroy submerged aquatic vegetation and therefore detrimental to duck and native fish population. The fish can survive cold winter periods; salinity up to about 5% is tolerated. The optimal PH range is 6.5-9.0. The species can survive low oxygenation concentration (0.3-0.5mg/litre) as well as super saturation.

Fishes generally have low blood volume than other vertebrates. The volume usually ranging between 30-40 ml/kg in bony fishes. Cellular constituents of the blood are RBC's or erythrocytes and WBC's or leucocytes. Erythrocytes obtain their characteristic colour from hemoglobin. Erythrocytes of fishes are nucleated and usually oval in shape, generally ranging from 12-14 microns in length and 8.5-9.5 microns in width. The percentage of the blood made up of red cells is called the hematocrit and correlated with the red cell count.

Common carp is a hardy fish and adapted almost to all the environments. Due to the change in the physic-chemical parameters of the water body, It is being presumed that the Hemato-biochemical parameters were also changed. Hence during the present study an attempt has been made to study the Hemato-biochemical parameters of common carp Cyprinus carpio.

2. Material and Methods.

The blood was taken from the heart by stabbing the needle through the ventral body wall exactly in the mid line from the posterior margin of the opercula covered directed darsocaudally at an angle of 45^{o}C (Lucky 1977). This was most commonly method used. The blood samples were taken in glass vials containing EDTA as an anticoagulant at an approximately concentration of 5mg/ml of blood (Blaxhall and Daisley 1973). RBC s and WBC s were measured Haemocytometer.Glucose was assessed by O.toluidine method and Plasma osmolarity by micro-osmometer.

3. Results.

During the present study, table 1, highest number of RBC's was observed during summer i.e. 5.258 and lowest during winter i.e., 3.00. The highest standard deviation observed during summer viz.7.479 and lowest at winter viz.0.1595. The P. value is <0.0001 extremely significant. Variation among column means is significantly greater than expected by chance.

During the present study, table 2, highest number of WBC's was observed during spring i.e.

4.233 and lowest during summer i.e., 2.463. The highest standard deviation observed during winter viz.6.483 and lowest at summer viz.0.2618. The P. value is <0.0001 extremely significant. Variation among column means is significantly greater than expected by chance.

During the present study, table 3, highest amount of glucose concen. Was observed during autumn 82.5 and lowest during winter 54.583. The highest standard deviation observed during Autumn 11.156 and lowest at winter viz.3.579. The P.Value for glucose is <0.0001. Considered extremely significant. Variation among column means is significantly greater than expected by chance.

During the present study, table 4, highest amount of plasma osmolarity concen. Was observed during autumn 361.5 and lowest during winter 351.75. The highest standard deviation observed during Autumn 1.933 and lowest at winter viz.0.3917.

The P.value is <0.0001 considered extremely significant .Variation among column means is significantly greater than expected.

Table-1. Measurement of RBC s during various seasons.

PARAMETER	WINTER	SPRING	SUMMER	AUTUMN
MEAN	3.00	3.083	5.258	3.125
S.D.	0.1595	0.232	7.479	0.2094
P.VALUE	>0.10	>0.10	<0.0001	>0.10
PASSED NORMALITY TEST	yes	yes	no	yes

Table.2. Measurement of WBC s during various seasons.

PARAMETER	WINTER	SPRING	SUMMER	AUTUMN
MEAN	4.425	4.233	2.463	3.85
S.D.	6.483	5.815	0.2618	5.090
P.VALUE	<0.0001	<0.0001	>0.10	<0.0001
PASSED NORMALITY TEST	no	N0	yes	no

Table.3. Measurement of glucose during various seasons.

PARAMETER	WINTER	SPRING	SUMMER	AUTUMN
MEAN	54.583	62.583	72.916	82.5
S.D.	3.579	5.265	8.426	11.156
P.VALUE	1.033	1.520	2432	3.220
PASSED NORMALITY TEST	>0.10	0.0837	0.0009	0.0002

Table.4. Measurement of Plasma osmolarity s during various seasons.

PARAMETER	WINTER	SPRING	SUMMER	AUTUMN
MEAN	351.75	352.25	355.16	361.5
S.D.	0.3917	0.4626	1.134	1.933
P.VALUE	>0.10	>0.10	>0.10	>0.10

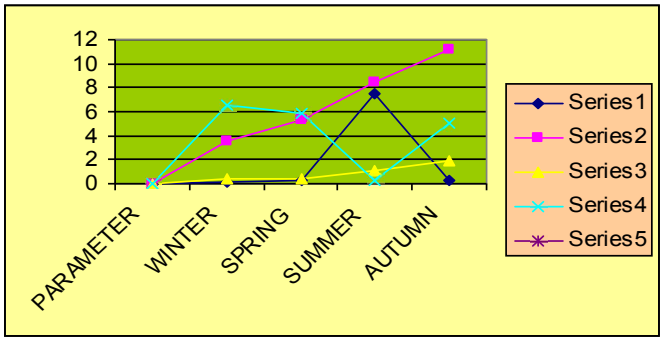

Fig. Showing fluctuation in RBC's, WBCs, glucose and Plasma osmolarity of common carp during various seasons.

4. Discussion.

Crowding is considered a common aquaculture related stressor and produces a wide variety of effects on fish such as reduced growth, health and feed conversion ratio's (wedemeyer 1997). Two factors can affect fish physiology under crowded conditions.

The carrying capacity of water to provide oxygen and to dilute metabolic wastes can act as a stressor. Also the requirement for adequate space limits fish health. The rate of oxygen consumption and ammonia excretion are the factors that limit carrying capacity of water (colt and Orwicz 1991). Decreases in hematocrit and hemoglobin could be the result of blood osmo- concentration, as sham by an increase in plasma osmolarity. This osmo concentration leads to hemodilution by body cell water. The decrease in hemoglobin concentration in cold treated fish could be also associated with a diminution of erythrocyte size (Bollard et al 1993). The increase in osmolyte concentration in the plasma leads to water loss from erythrocyte and thus to their shrinkage. Hemolysis has been reported in common carp (Cyprinus carpio) during acute water temperature changes from 8c to 4 c. (Chen et al., 1995).

Temperature affects the blood sugar, urea, uric acid and protein levels, but the pattern was inconsistent. A positive correlation was observed among weight, length, mean cell volume and mean cell hemoglobin. Whereas a negative correlation was noted in hemoglobin and hematocrit. The blood glucose and total plasma protein, uric acid and urea were negatively was correlated with total weight and length, whereas total plasma protein was positively correlated with length. The variation in hematological and biochemical parameters obtained in this study emphasizes the need of more study on large number of fish population at different seasons and different age, sex and environmental conditions to confirm these findings of healthy Sudanese *Schizothorax niger*

As temperature decreases the osmotic concentration and blood viscosity increase. Coping with low temperatures requires the ability to maintain homeostasis. Hematological changes are good indicators of this performance (Chen et al., 1995). The increase of blood glucose is the most studied response in this regard. It is the result of the activation of glycogenolysis that is under cortisol control (Vijayan et al 1992). Hyperglycemia during cold exposure has been reported in many species (Chen et al 1995; Staurnes et al 1994). In cold treated fish, increased plasma glucose is used mainly as an osmolyte. Salmonid fish including Cyprinus carpio survive at low temperature by concentrating their plasma and cellular fluid electrolytes (Na and it) and other osmolyte like glucose.

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Corresponding author
Aijaz Ahmad Bhat
Post Graduate Department of Zoology, University of Kashmir Srinagar – 190006.
aijazafzal@gmail.com

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