

**SEASONAL VARIATION IN BLOOD PARAMETERS OF FRESH WATER FISHES
(*CYPRINUS CARPIO* AND *CLARIAS BATRACHUS*) IN BUNDELKHAND REGION**

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ABSTRACT

The purpose of the present study was to know the seasonal (rainy and winter) variation in haematological and biochemical parameter of two fishes (*Cyprinus carpio* and *Clarias batrachus*). In our finding hemoglobin level (10.1 ± 0.65 , 7.74 ± 0.45 and 9.12 ± 0.88 , 8.82 ± 0.67) decreased in winter season in both species while cholesterol level (145.6 ± 5.12 , 212 ± 8.03 and 165.6 ± 5.12 , 195.6 ± 14.7) increased and no significant difference (4.77 ± 0.46 , 4.82 ± 0.40) in the protein content was observed in *Cyprinus carpio* but in *Clarias batrachus* little variation (5.21 ± 0.46 and 6.30 ± 0.39) was observed. Glucose level decreased in *Cyprinus carpio* (from 82.4 ± 14.5 to 67.4 ± 4.33) but increased (from 78.4 ± 14.58 to 151.4 ± 25.14) in *Clarias batrachus* during rainy to winter season.

Keywords: *Cyprinus carpio*, *Clarias batrachus*, Haematological parameters, Serum, Biochemical parameters

INTRODUCTION

Bundelkhand is an old landmass composed of horizontal rock-beds resting on a stable foundation it lies in central India and covering two states (Uttar Pradesh and Madhya Pradesh). The current level of fish

productivity from inland water bodies in Bundelkhand is low due to improper market channel and limited efforts from the fisheries department but over the years, there has been a rise in demand for fresh water fishes. This

has led to trust on enhancing production through scientific cultivation practices like induced breeding and fish cultivation in such water bodies was viewed as a profitable enterprising activity in Bundelkhand and aquaculture has potential to enhance livelihood of large proportion of poor families.

In our experiment *Cyprinus carpio* and *Clarias batrachus* was selected as an experimental modal because due to its higher percentage of protein and iron, as compared to other freshwater edible fish species.

Haematological and biochemical analysis is an important tool that can be used for effective and sensitive monitoring of physiological and pathological state of a fish as these parameters are closely related to the response of fish to environment and biological factors [1-3]. Blood is an important component for studying the seasonal effects of toxicant as it environment fluctuations [4]. Blood is a physiological indicator of the body as it is highly susceptible to internal and external environment fluctuations in stress conditions.

The present work on the seasonal variation on some blood parameter in rainy

RESULTS AND DISCUSSION

The results of experiments of *Cyprinus carpio* and *Clarias batrachus* summarized in

and winter season was conducted to get reliable knowledge about the change in haematology and biochemical parameters including hemoglobin, serum protein, blood glucose and cholesterol.

MATERIALS AND METHODS

The experimental fish was collected from the local fisherman of fish Market and transferred to experimental site/lab at Bipin bihari (P.G) college and acclimatize for 15 days in plastic tank, supplied with a artificial diet two times a day. The experiment conducted from August, 2018 to January, 2019 during rainy and winter season. In our experiment 10 individual of each species were selected. Blood sample was obtained from the caudal peduncle region, using 2ml syringe containing EDTA (anti – coagulant) for measuring haemoglobin using haemocytometers and glucose by glucometer (New Accu-check meter). The serum biochemical parameters like protein and cholesterol were estimated by using standard kit (Crest Biosystem, India). For statistical calculation mean value and standard deviation were determined for each parameter.

Table 1 and 2. The haemoglobin concentration of *Cyprinus carpio* in rainy season 10.1 ± 0.65 while in winter 7.74 ± 0.45

was observed. On the other hand haemoglobin concentration of *Clarias batrachus* is 9.12 ± 0.88 in rainy season and 8.82 ± 0.67 in winter season. In both the species the haemoglobin value decrease in winter season these finding were also obtained by other workers [5-7]. The difference in haemoglobin concentration in season, due to external as well as internal factors and availability of fresh oxygen due to rain water and favorable environmental temperature [8]. Seasonal difference may be due to increase in the length and age of fish. In Rainy season food is available in sufficient amount so the fish is more worthy in rainy season as compared to winter season. In present study glucose level in *Cyprinus carpio* gradually decreased from rainy to winter season (82.4 ± 14.5 and 67.4 ± 4.33) in their standard form and in *Clarias batrachus* increased from rainy to winter season (78.4 ± 14.58 and 151.4 ± 25.14). Glucose, a carbohydrate, has major role in the bioenergetics of animals. These get transformed to chemical energy (ATP) and then mediate various metabolic processes besides being expressed as mechanical energy and glucose must be maintained at adequate levels in the serum [9]. According to Mommsen et al., (1999) and Flodmark et al., (2001) the increase level of glucose is the

indicator of stress in many fishes or may be due to injection (Hormone) stress, the chromaffin cells release catecholamine hormones, adrenaline and noradrenaline in blood circulation, which initiate glucose production in fish through gluconeogenesis and glycogenolysis pathways and increase glucose level [10,11].

The serum protein measurement in the *Cyprinus carpio* demonstrates no significant difference between rainy and winter season (4.77 ± 0.46 and 4.82 ± 0.40). But in *Clarias batrachus* there is little difference in serum protein concentration in rainy and winter season (5.21 ± 0.46 and 6.30 ± 0.39). The differences in biochemical parameters vary from species to species and can be influenced by many biotic and abiotic factors such as water, temperature, seasonal pattern, food, age and sex of the fish or this may probably due to an increased depletion of liver glycogen [12]. The increased serum protein concentration can be caused by structural liver alternations that reduce aminotransferase activity, with concurrent reduction in deamination capacity [13,14] (Figure 1).

The Cholesterol level of blood serum in *Cyprinus carpio* illustrate an increasing trend from rainy to winter (145.6 ± 5.12 to 212 ± 8.03) and in *Clarias batrachus* is also

increased from rainy to winter (165.6 ± 5.12 to 195.6 ± 14.7). The cholesterol content increases during winter season because the food consumed by fish used in maturation or development of gonads [15]. Besides these other factors such as varied water quality,

pollution, malnutrition, infection and disease and various other environmental conditions might change fish physiological activities and all these above factors linked to fish health (Figure 2).

Table 1: Seasonal variation in blood parameters of fresh water fish of *Cyprinus carpio* and *Clarias batrachus* in Rainy season

PARAMETERS	<i>Cyprinus carpio</i>	<i>Clarias batrachus</i>
Haemoglobin(mg/dl)	10.1±0.65	9.12±0.88
Glucose(mg/dl)	82.4±14.5	78.4±14.58
Protein(mg/dl)	4.77±0.46	5.21±0.46
Cholesterol(mg/dl)	145.6±5.12	165.6±5.12

Table 2: Seasonal variations in blood parameters of fresh water fish of *Cyprinus carpio* and *Clarias batrachus* in Winter season

PARAMETERS	<i>Cyprinus carpio</i>	<i>Clarias batrachus</i>
Haemoglobin(mg/dl)	7.74±0.45	8.82±0.67
Glucose(mg/dl)	67.4±4.33	151.4±25.14
Protein(mg/dl)	4.82±0.40	6.30±0.39
Cholesterol(mg/dl)	212±8.03	195.6±14.7

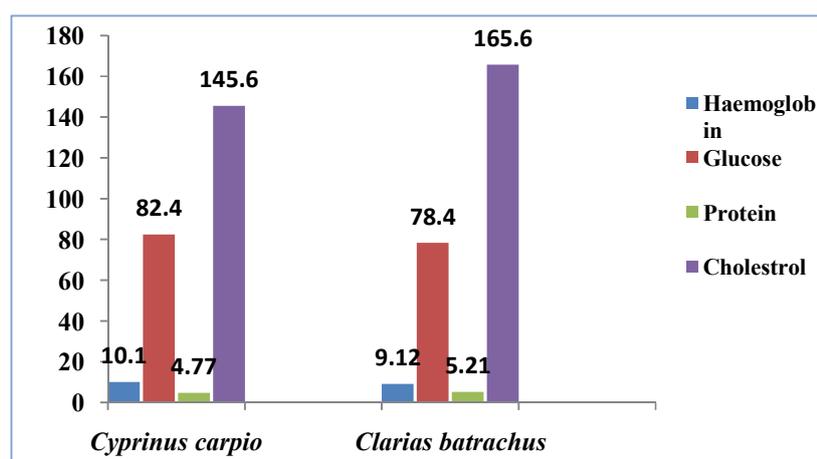


Figure 1: Seasonal variation in blood parameters of fresh water fish of *Cyprinus carpio* and *Clarias batrachus* in Rainy season

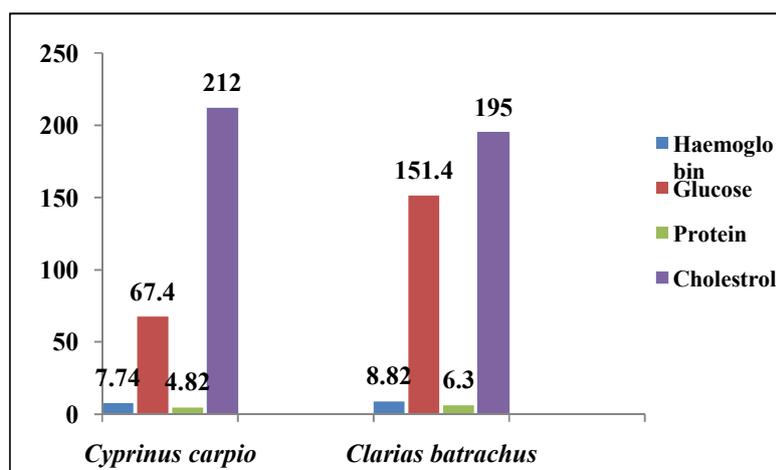


Figure 2: Seasonal variations in blood parameters of fresh water fish of *Cyprinus carpio* and *Clarias batrachus* in winter season

CONCLUSION

The ranges of normal values of the haematological and biochemical parameters are still undefined for different species in different aquaculture conditions. The results of present research provide the knowledge of the characteristics of haematological parameters of fresh water fishes. We suggest that the haematological and biochemical studies on fishes have assumed greater significance due to the increasing emphasis on pisciculture and greater awareness of the pollution in aquatic ecosystem.

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