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## Seasonal variation in blood parameters of fresh water fishes (*Wallago attu* and *Cirrhinus mrigala*) in at Govindgarh lake, Rewa

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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 (*Wallago attu* and *Cirrhinus mrigala*). In our finding hemoglobin level ( $9.88 \pm 0.77$ ,  $7.68 \pm 0.64$  and  $9.05 \pm 0.67$ ,  $8.77 \pm 0.97$ ) decreased in winter season in both species while cholesterol level ( $144.8 \pm 5.16$ ,  $209 \pm 7.18$  and  $166.8 \pm 5.26$ ,  $196.8 \pm 15.8$ ) increased and no significant difference ( $4.62 \pm 0.52$ ,  $4.96 \pm 0.33$ ) in the protein content was observed in *Wallago attu* but in *Cirrhinus mrigala* little variation ( $5.32 \pm 0.55$  and  $6.44 \pm 0.88$ ) was observed. Glucose level decreased in *Wallago attu* (from  $81.6 \pm 12.6$  to  $68.5 \pm 4.42$ ) but increased (from  $77.8 \pm 13.72$  to  $149.6 \pm 22.19$ ) in *Cirrhinus mrigala* during rainy to winter season.

**Keywords:** *Wallago attu*, *Cirrhinus mrigala*, Haematological parameters, Serum, Biochemical parameters

#### Introductions

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 (Steinhagen *et al.* 1990, Fernandes & Mazon, 2003, Kohanestani *et al.* 2013, Dutta and Dutta, 2014) [1-3, 17]. Blood is an important component for studying the seasonal effects of toxicant as it environment fluctuations (Satheesh *et al.* 2011) [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 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

**Study site:** The Govindgarh lake is one of the unique water body in M.P. and located in south of Rewa district at a distance of 20 km. with a longitude  $81^{\circ}15'0''$  and latitude  $24^{\circ}20'25''$ . It comes under the Rewa district and in Huzur tehsil. The lake is connected with Rewa-Shahdol and Satna-Sidhi road. The lake was formed by impounding of small nalla originating from Kaimore hill. With a view to storing rain water, the Maharaja of Rewa at that time built a Bandh across the nalla to form a tank in 1958.

Various species of fishes were bred in this lake and feed of gram and small pills of wheat flour was given to them twice a day from the budget sanctioned by Rewa state. Fishing in the lake was totally prohibited. This practice continued till it was handed over to the M.P. Government. Now fisheries department looks after it and exports fishes worth several thousand rupees every years.

**Data analysis:** The experimental fish was collected from the local fisherman of fish Market and transferred to experimental site/lab at Deptt. Zoology, Govt. I.G. Home Science Girls P.G. College, Shahdol (M.P.) and acclimatize for 15 days in plastic tank, supplied with a artificial diet two times a day. The experiment conducted from August, 2020 to January, 2021 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.

**Results and Discussion**

The results of experiments of *Wallago attu* and *Cirrhinus mrigala* summarized in Table 1 and 2. The haemoglobin concentration of *Wallago attu* in rainy season  $9.88 \pm 0.77$  while in winter  $7.68 \pm 0.64$  was observed. On the other hand haemoglobin concentration of *Cirrhinus mrigala* is  $9.05 \pm 0.67$  in rainy season and  $8.77 \pm 0.97$  in winter season. In both the species the haemoglobin value decrease in winter season these finding were also obtained by other workers (Golemi *et al.* 2012, 2013, Sheikh & Ahmed, 2016) [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 (Pradhan *et al.* 2012) [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 *Wallago attu* gradually decreased from rainy to winter season ( $81.6 \pm 12.6$  and  $68.5 \pm 4.42$ ) in their standard form and in *Cirrhinus mrigala* increased from rainy to winter season ( $77.8 \pm 13.72$  and  $149.6 \pm 22.19$ ). 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 (Percin and Konyalioglu, 2008) [9]. According to Mommsen *et al.* (1999) [10] and Flodmark *et al.* (2001) [11] 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 (Mommsen *et al.* (1999) [10] and Flodmark *et al.* (2001) [11].

The serum protein measurement in the *Wallago attu* demonstrates no significant difference between rainy and winter season ( $4.62 \pm 0.52$  and  $4.96 \pm 0.33$ ). But in *Cirrhinus mrigala* there is little difference in serum protein concentration in rainy and winter season ( $5.32 \pm 0.55$  and  $6.44 \pm 0.88$ ). 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 (Jawad *et al.* 2004) [12]. The increased serum protein concentration can be caused by structural liver alternations that reduce aminotransferase activity, with concurrent reduction in deamination capacity (Kavadias *et al.* 2004 and Hrubec *et al.* 2001 and Southamani *et al.* 2015) [13-15] (Figure 1).

The Cholesterol level of blood serum in *Wallago attu* illustrate an increasing trend from rainy to winter

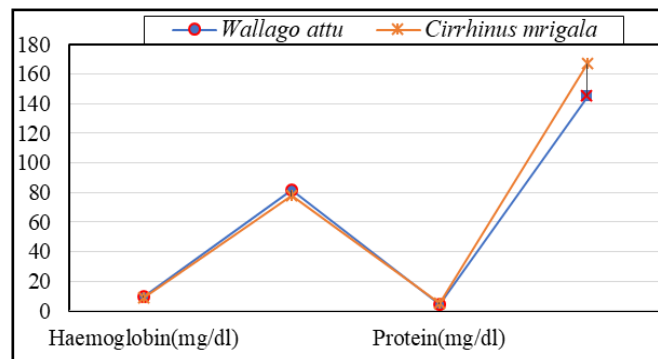
( $144.8 \pm 5.16$  to  $209 \pm 7.18$ ) and in *Cirrhinus mrigala* is also increased from rainy to winter ( $166.8 \pm 5.26$  to  $196.8 \pm 15.8$ ). The cholesterol content increases during winter season because the food consumed by fish used in maturation or development of gonads (Sreevalli and Sudha, 2012) [16]. 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 *Wallago attu* and *Cirrhinus mrigala* in Rainy season.

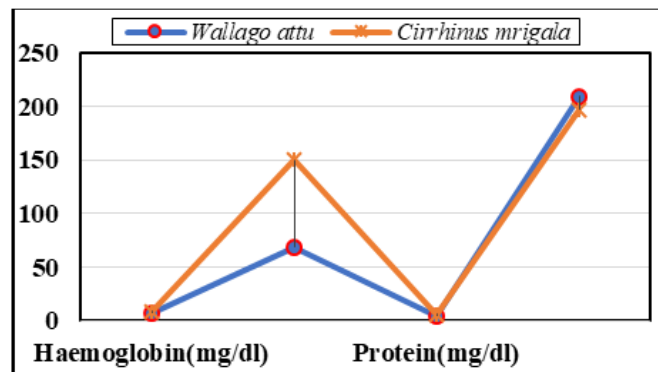
Parameters	<i>Wallago attu</i>	<i>Cirrhinus mrigala</i>
Hemoglobin (mg/dl)	$9.88 \pm 0.77$	$9.05 \pm 0.67$
Glucose(mg/dl)	$81.6 \pm 12.6$	$77.8 \pm 13.72$
Protein(mg/dl)	$4.62 \pm 0.52$	$5.32 \pm 0.55$
Cholesterol(mg/dl)	$144.8 \pm 5.16$	$166.8 \pm 5.26$

**Table 2:** Seasonal variations in blood parameters of fresh water fish of *Wallago attu* and *Cirrhinus mrigala* in winter season.

Parameters	<i>Wallago attu</i>	<i>Cirrhinus mrigala</i>
Haemoglobin (mg/dl)	$7.68 \pm 0.64$	$8.77 \pm 0.97$
Glucose(mg/dl)	$68.5 \pm 4.42$	$149.6 \pm 22.19$
Protein(mg/dl)	$4.96 \pm 0.33$	$6.44 \pm 0.88$
Cholesterol(mg/dl)	$209 \pm 7.18$	$196.8 \pm 15.8$



**Fig 1:** Graph analysis of Seasonal variation in blood parameters of fresh water fish of *Wallago attu* and *Cirrhinus mrigala* in Rainy season.



**Fig 2:** Graph analysis of Seasonal variations in blood parameters of fresh water fish of *Wallago attu* and *Cirrhinus mrigala* 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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