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Role of blood glucose during reproductive cycle of *A. cuchia.*

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Abstract: The blood glucose level show annual variation correlated with the reproductive cycle. Blood glucose levels are used to determine the food value of *A .cuchia* as well as to forecast the efficiency of spawning. In the present study a lower level of blood glucose was recorded in both the sexes during spawning period which was attributed to the fact that spawning is most exhaustive task and it requires a lot of energy. The higher and almost constant level of glucose observed in other phases of reproductive cycle of this fish was probably due to gluconeogenesis to maintain the glucose level which was supposed to be the essential requirements as substrate for anaerobic respiration.

Key words: Blood glucose, *Amphipnous Cuchia*, Reproductive phases etc.

INTRODUCTION

Among biochemical constituents, blood glucose plays a very important role in the fish physiology in relation to its reproductive cycle. It is established fact that growth is important characteristics of the vital activity manifested in a quantitative increase of the body mass. The vital activity during the reproductive cycle of *Amphipnous cuchia* requires a lot of energy .During reproduction fishes sustain a lot of stress related to metabolic and environmental changes. Blood glucose is a good stress indicator and the response to stress in fish include hypothalamus, neuroendocrine system and ultimately metabolic changes and physiological changes (Lowe &Davison 2005)[1]. The energy dynamics of the male and female *Amphipnous cuchia* are somewhat different in reproductive cycle. However the role of blood glucose in *Amphipnous cuchia* has been little studied in relation to sex, age and the annual cycle. Several investigators have investigated the biochemical content in the blood of fish. Das (1965)[2] has observed a positive correlation between glucose and age of *Catla catla*. Singh .B .R ET; al (1976) observed a decrease in blood glucose level during non breeding period (September to April) in comparison to spawning period. In the present study also a good correlation was observed between the blood glucose level and different phases of reproductive cycle of *Amphipnous Cuchia*. The blood glucose level was higher during spawning period due to highest metabolic activities.It is established fact that the long period of starvation during spawning needs more energy for egg production leading to reduce glucose level (Farid Firouzbakhsh et al.2013)[3].

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MATERIALAND METHODS

Healthy and matured fish of both sexes were collected from the semi derelict swamps from the surrounded areas with the help of local fisherman. Fishes were brought to laboratory and kept in a large aquarium in a group of ten fishes of each sex. Before putting them in aquarium they were dipped in a potassium permanganate solution for a moment to get rid of microbial infection. Fishes were left

for a fortnight to acclimatize in the laboratory condition under natural temperature and photo period. Fishes were fed with supplementary diet during this period.

The acclimatized fishes of both sexes of *Amphipnous cuchia* were sacrificed on each month of the year for evaluating the annual fluctuation in glucose level. Estimation of blood glucose level was done by Folin and Wu (1920) method. The quantitative analysis was done colorimetric ally by spectrophotometer (spectronic-20) using filter of 420 nm against a blank.

RESULTS AND DISCUSSION

As shown in Table, an obvious relationship exists between the blood glucose content and different phases of the reproductive cycle. An inverse trend in blood glucose content was noticed during reproductive cycle. In the present study a lower level of blood glucose was recorded in both male and female fishes during spawning period , while a higher blood glucose level was recorded in post spawning ,non breeding and maturing period. This may be attributed to the fact that fishes require more energy for their higher metabolic activities necessitated for gonadal development, whereas low blood glucose level in the spawning period suggest that due to maturation of gonads the fish activity decrease in comparison to other phases of reproductive cycle. Several investigators have also reported variation in glucose level during annual cycle in other fishes. Raizada et al (1984) in *Cirrihinus mrigala* reported a decrease in blood glucose level in rainy season or spawning period than summer and winter season which correspond to post spawning, prepatory and maturing period of the cycle. Robertson et, al; (1961) reported a rise in blood sugar during maturation in *Opsannus tau* and *Onchorhynchus tschawytscha*. The glucose level found to be increased during spawning period in male and female *Notopterus notopterus.* Nikolsky (1963)[4] reported fish deposits nutrients in the liver and the deposited glucose are used during reproduction .Kocaman et al (2005)[5] reported differences in glucose concentration in rainbow trout (*Onchorhynchus mykiss*) prior and during reproduction. Some authors also reported that serum glucose levels increased till pre spawning period than rapid fall was observed. During maturing and spawning periods stress hormones are released and causes asudden increase in plasma glucose and its fall afterwards.(Begg & Pankhurst 2004)[5].

The almost constant level of blood glucose observed in different phases of the reproductive cycle of the fish was probably due to gluconeogenesis to maintain the glucose level which was supposed to be the essential requirement as a substrate for anaerobic respiration. The discharge of genital product during spawning period alternates with maturation of next batch of the generative tissue. This requires an extremely high level of metabolism permitting both catabolic and anabolic processes of high intensity. As such consumption of oxygen was higher in this period than the rest of the annual cycle. This hold true in the present investigation as erythrocytes number increase and energy reserve like glucose depletes in this phase.

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Table 1. Average blood glucose content during different reproductive phases of male of female *A. cuchia*. (unit of measurement-mg/100ml).

S.N	Preparatory phase		Maturing phase		Spawning phase		Post spawning phase		Non breeding phase	
	M	F	M	F	M	F	M	F	M	F
1	97.00	100.50	102.00	103.06	99.00	100.00	100.00	102.00	101.11	03.00
2	97.45	99.00	100.00	101.00	98.00	96.00	99.00	102.00	100.00	02.00
3	95.00	96.00	98.00	99.00	95.00	97.00	98.00	100.00	98.00	00.00
4	93.00	95.50	97.00	98.00	94.00	95.00	98.00	99.00	98.00	99.02
5	95.00	95.00	97.00	97.00	95.00	94.00	96.00	98.00	96.00	98.00
6	94.05	94.00	96.00	97.00	92.40	94.50	96.00	96.00	96.00	96.00
7	91.25	92.10	95.00	96.00	92.00	92.00	95.00	96.00	95.00	95.00
8	92.00	91.00	94.00	94.00	91.00	90.10	94.00	95.00	94.00	94.00
9	92.10	91.00	94.00	94.00	90.50	91.00	94.00	94.00	93.00	94.00
10	91.00	91.00	93.00	93.85	91.00	90.10	93.00	94.00	92.00	94.00
MEAN	93.79	94.51	96.60	97.29	93.37	93.97	96.30	97.60	96.31	97.50
S.E ±	0.69	1.01	0.85	0.93	0.89	0.97	0.71	0.92	0.89	1.02