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Determination of Biochemical Parameter Values of Chub (*Leuciscus cephalus)* Population in Almus Dam Lake, Turkey

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Abstract: The aim of this study was to determine some biochemical parameters of *Leuciscus cephalus* in Almus Dam Lake (Turkey). A total of 54 (20 male and 34 female) sexually mature and healthy chubs were examined. Biochemical measurements were carried out for phosphorus (P mg dL^{-1}), calcium (Ca mg dL^{-1}), iron (Fe mg dL^{-1}), cholesterol (Chol, mg dL^{-1}), glutamic oxaloacetic transaminase (GOT U/L), total protein (TP mg dL^{-1}), lactacdehydragenes (LDH U/L), globulin (GLO g dL^{-1}), albumin (ALB g dL^{-1}) and trigyleser (TRI mg dL^{-1}) and the values over sex were 12,00±2,83 mg dL^{-1}, 18,49±3,86 mg dL^{-1}, 17,41±1,83 mg dL^{-1}, 293,98±89,27 mg dL^{-1}, 325,2±22,93 mg dL^{-1}; 6,07±2,657 mg dL^{-1}, 1232,3±271,21 mg dL^{-1}, 5,85±2,598 mg dL^{-1}; 1,01±0,335 mg dL^{-1} and 117,8±14,07 mg dL^{-1} respectively. Male and females were not significantly different from each other for these indices accept for cholesterol (males: 259,8±85,87 mg dL^{-1}, females: 314,1±86,18 mg dL^{-1})

Key words: *Leuciscus cephalus*, biochemical indices, fish blood plasma

INTRODUCTION

Natural changes in environmental conditions associated with season can affect blood chemistry and hematology. Sex of the fish may also influence the blood parameters[1-9]. Results obtained from examination of blood and body fluids are critically important for monitoring the health and condition of both wild and cultured fish [10,11].

The application of hematological information in the field of fisheries attracted growing interest especially after 1980. There are also various researches regarding blood parameters of fishes inhabiting Turkish waters [12,18]. The chubs (*Leuciscus cephalus*) have been identified as a candidate species for aquaculture because of their high growth rate and market value and it is one of the commercially important fish inhabiting in Turkish waters.

Accumulation of reference values in biochemical blood parameters of healthy chub is useful in interpreting laboratory results associated with disease or ecological conditions. The goal of this study was to determine the biochemical blood parameters of *Leuciscus cephalus* inhabiting Almus Dam Lake (Turkey).

MATERIALS AND METHODS

A total of 20 male and 34 female chubs, *Leuciscus Cephalus,* were caught from Almus Dam Lake of Tokat province of Turkey for the study. All the chubs examined were sexually mature and healthy, and their average weight was 240±10 g. Blood sampling was performed immediately after fish were captured. Approximately 4 ml of blood was collected from the caudal vein (see for a review of the collecting techniques:[19]) and set to a vacutainer biochemical tubes. EDTA and an aqueous solution of heparin were used as anticoagulants[20,21]. Blood samples were centrifuged at 4000 rpm for 10 minutes, and then they were analyzed with an auto-analyser, Merck-Mega/Toshiba. Biochemical measurements were carried out for phosphorus (P mg dL^{-1}), calcium (Ca mg dL^{-1}), iron (Fe mg dL^{-1}), cholesterol (Chol, mg dL^{-1}), glutamic oxaloacetic transaminase (GOT U/L), total protein (TP mg dL^{-1}), lactacdehydragenes (LDH U/L), globulin (GLO g dL^{-1}), albumin (ALB g dL^{-1}) and trigyleser (TRI mg dL^{-1})[22]. Statistical analyses were carried out using SPSS software.

RESULTS

Temperature, dissolved oxygen and pH values of water were recorded between September and January and presented in (Table 1).

Biochemical parameters examined and the average values are presented in ($p<0.01$).

Table 2. There were no significant differences (mg dL^{-1}0.05) in all the parameters between males and females except for cholesterol ($p<0.01$).

Table 1:Mean water quality parameters at the sampling sites and times.

	Mean±SD	Minimum	Maximum
Temperature (°C)	10.4± 2.47	5.6	18.5
Dissolved oxygen (mg L^{-1})	8.1 ±0.32	7.6	10.7
pH	7.9 ±0.02	7.1	8.6

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Table 2:Biochemical parameters of healthy male and female chubs

	Male			Female			Overall		
Parameters	N	Mean	SD	N	Mean	SD	N	Mean	SD
P (mg dL^{-1})	13	0019.55	003.239	34	0017.88	004.023	47	0018.49	003.86
Ca (mg dL^{-1})	14	0012.42	002.529	34	0011.76	002.963	48	0012.00	002.83
Fe (mg dL^{-1})	16	0017.50	001.751	34	0017.35	001.937	50	0017.40	001.863
Chol (mg dL^{-1})	20	0259.8	085.87	33	0314.1	086.18	53	0293.6	089.27
GOT (U/L)	8	0328.3	020.92	34	0323.4	023.57	42	0325.2	022.93
TP (mg dL^{-1})	16	0006.56	002.898	34	0005.78	002.542	50	0006.07	002.657
LDH (U/L)	15	1243.9	321.56	34	1225.4	251.03	54	1232.3	271.2
Globulin (g dL^{-1})	20	0005.69	002.732	34	0004.73	002.516	49	0005.04	002.598
ALB (g dL^{-1})	20	0000.95	000.358	34	0001.05	000.319	54	0001.01	000.335
TRI (mg dL^{-1})	18	0117.2	013.82	34	0118.1	014.39	52	0117.8	014.07

DISCUSSION

Ca, P and Fe: Calcium and Phosphorus values were found higher in males than females. Overall means of Ca and P were 12,00±2,83 mg dL^{-1} and 18,49±3,86 mg dL^{-1} respectively. In this research, Ca and P values were higher than reported by Hasiloglu et al 2002. Calcium is a critical component in the reproductive processes of fish and plays an important role in osmoregulation[26]. Hence, the differences between the reports might arise from ecological conditions and reproductive status of fish. Iron level of examined fishes (17.40±1.863) was similar to reported (17±1.39) by[17].

Cholesterol: Cholesterol, a component of all eukaryotic plasma membranes, is essential for the growth and viability of cells in higher organisms. However, too much cholesterol can be lethal because of atherosclerosis resulting from the deposition of laques of cholesterol esters. Cholesterol is also the precursor of steroid hormones such as progesterone, testosterone, estradiol and cortisol[27].

The value of blood cholesterol changes as depending on fish species. For example, in *Ctenopharyngodon idella* 10.9±0.49 mg g^{-1}[28], in *Cyprinus carpio* 173±21 mg 100 mL[28], and in *Leuciscus cephalus* 420±137 mg dL^{-1}[17]. This study has revealed that females have (314,1±86,18 mg dL^{-1}) significantly higher ($p<0.01$) concentration of cholesterol than males (259,8±85,87 mg dL^{-1}).

GOT, TP and LDH: The values of GOT, TP and LDH in fish blood were observed as 325,2±22,93 mg dL^{-1}; 6,07±2,657 mg dL^{-1} and 1232,3±271,21 mg dL^{-1} respectively. These values were in agreement with Hasiloglu at al (2002) who reported as 335,42±85,05 mg dL^{-1}; 4,07±1,06 mg dL^{-1} and 1233±331 mg dL^{-1} respectively for the same species living in Demir Doven Dam lake, Turkey. Unlike the level of cholesterol, males have slightly higher ($p>0.05$) values of GOT, TP and LDH than females have.

GLO, ALB and TRI: GLO, ALB and TRI values were found over the sex as 5.04±2.598 mg dL^{-1}; 1.01±0.335 mg dL^{-1} and 117.8±14.07 mg dL^{-1} respectively. GLO (5.85±2.598) and TRI (117.8±14.07) values over the sex were higher than the values of previous study conducted in Turkey by[17], who determined these values as 2.66±1.13 and 100±29.7 respectively. On the other hand ALB value (1,01±0,335 mg dL^{-1}) was very similar (1,1±0,35) with the report of[17] for the same species.

CONCLUSIONS

It is well known that many factors significantly alter biochemical and hematological parameters in fishes. These factors include diet, strain, age, sex, state of sexual maturity even season and method of capture[28]. Blood chemistry measurements are significantly affected by the wide range of environmental conditions experienced by fish over the course of a year[6,7,9] Future studies on the same species especially sharing common environments will gain our understanding of the impact of ecological conditions over the fish populations and these biochemical blood parameters of healthy chub could be used as reference values in interpreting results associated with disease or other conditions.

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