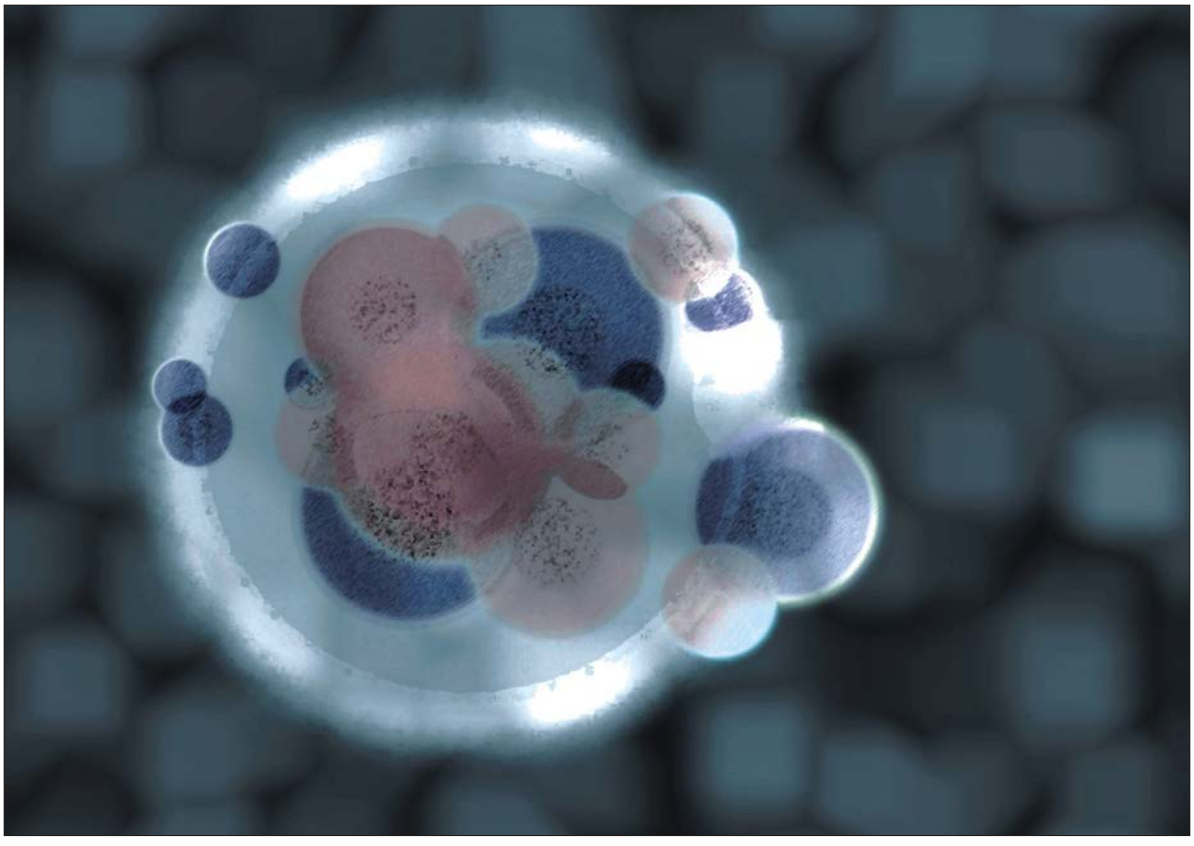

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Blood Chemistry (Electrolytes, Lipoproteins and Enzymes) Values of Black Scorpion Fish (*Scorpaena porcus* Linneaus, 1758) in the Dardanelles, Turkey

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Abstract: Blood samples were collected from 72 Black scorpion fish (*Scorpaena porcus*) to establish baseline blood serum chemistry values. Mean±S.E values obtained by auto analyzer were as follows: sodium, 195.07±1.7000 mmol L^{-1}; potassium, 3.810±0.1850 mmol L^{-1}; chlorine, 174.82±1.5600; phosphorus, 15.122±0.2640 mg dL; calcium 14.66±0.2830 mmol L^{-1}; iron 15.639±0.6560 μg dL^{-1}; very low-density lipoprotein, 7.65±0.3800 mg dL^{-1}; low-density lipoprotein, 15.36±1.6600 mg dL^{-1}; high-density lipoprotein, 20.36±0.7100 mg dL^{-1}; alanine aminotransferase, 28.89±2.26 IU L^{-1} and aspartate aminotransferase, 224.11±14.09 IU L^{-1}.

Key words: *Scorpaena porcus*, blood parameters, Dardanelles

INTRODUCTION

Fish blood, its hematological and biochemical parameters appear to be a suitable means to indicate environmental influences, stress effects of anthropogenic origin, condition, health as well as biological manifestations of these aquatic vertebrates. It is necessary to state that most data on the responses and changes of hematological and biochemical parameters of fish blood are available for those species which are the object of the pisciculture. So far, distinctly less attention has been paid to wild fish populations. The lack of knowledge of reference physiological values of blood parameters, the so-called "normal" values, prevents their use in assessing the condition of the aquatic environment, aquatic ecosystems and the lands pertaining to them[1,2].

Historically, blood chemistry parameters have been studied and baseline values have been established for fish species used in research or as food sources[2-15]. Hematological test and analyses of serum constituents have proved useful in the detection and diagnosis of metabolic disturbances and disease processes[16].

The Black Scorpion fishes are important commercial fish along the Dardanelles. Reproduction takes place between July and August in this area. The first maturity for males was at the 2 age group and 3 age groups for females[17]. Sedentary and solitary species inhabiting littoral waters amongst rocks and seaweeds. The littoral areas of the north-western Black Sea are critical habitats due to pollution. They feeds mainly on small fishes such as gobies and blennies, but also on crustaceans and other invertebrates[18].

The purpose of this study was to establish blood chemistry values of 11 clinical chemistry parameters in Black Scorpion fish which are used abundant at the sampling site.

MATERIALS AND METHODS

Experimental design: Black Scorpion fish were collected by set net, 20-30 m deep on the sea bottom, in the vicinity of Kilitbahir station in the Dardanelles in July-August 2001. In this study totally 72 fish were collected. Following the catch fish were transferred to Fisheries Faculty Laboratory (Çanakkale) live. Blood samples collected from each individual and body and total length were measured. Water temperatures and salinity were also recorded.

Blood collection: Blood sampling was performed immediately after fish were captured. Samples were collected from behind the anal fin using a 5 mL 22 no. plastic syringe. The blood samples, about 2.5 cc were placed into vacutaineers tubes[19].

Biochemical analyses: Biochemical analyses were conducted at State Hospital Biochemistry Laboratory (Çanakkale). Blood samples were centrifuged at 4000 rpm for 10 min[20] and extracted serum samples were analyzed using ILab 900 and 1800 auto analyzer by 2 h after sample collection. Biochemical measurements were carried out for Sodium (Na), Potassium (K), Chlorine (Cl), Phosphorus (P), Calcium (Ca), iron (Fe), Very Low-Density Lipoprotein (VLDL), Low-Density Lipoprotein (LDL), High-Density Lipoprotein (HDL), Alanine Aminotransferase (ALT), Aspartate Aminotransfrase (AST).

Statistical methods: Arithmetic mean ± SE, minimum and maximum values were determined for each blood chemistry parameters using a SPSS system computer statistical package.

RESULTS AND DISCUSSION

Table 1 shows the mean, standard error, minimum and maximum values for each blood chemistry parameters. Electrolyte (Na, K, Cl, P, Ca and Fe) levels indicate the operation of a variety of homeostatic mechanisms in the body [21]. In this study, Na levels were higher than the values in *Scophthalmus aquosus* (157.00±0.3-186.00±0.4 mmol L^{-1})[7] *Oreochromis niloticus* (161.8±4.2 mmol L^{-1})[15], *Piaractus brachypomus* (150.4 mmol L^{-1})[14], *Acipenser naccarii* (140.6±4.8)[13] and *Salmo salar* (137±1.1-196±18.6 mmol L^{-1})[6] but were lower than those of *Pagrus auratus* (204 mmol L^{-1})[12]. K levels were lower than the values in *Scophthalmus aquosus* (4.10±0.18-5.48±0.15 mmol L^{-1})[7], *Oreochromis niloticus* (4.83±1.15 mmol L^{-1})[15] and *Pagrus auratus* (6.0 mmol L^{-1}) [12] but were higher than those of *Salmo salar* (1.3±0.4-4.5±0.1 mmol L^{-1})[6]. At the same time, the densities of K were similar to those reported in *Piaractus brachypomus* (3.93 mmol L^{-1})[14] and *Acipenser naccarii* (3.6±0.3 mmol L^{-1})[13]. Ca activities were lower than values reported in *Oreochromis niloticus* (17.43±6.02 mg dL^{-1})[15] but were higher than values reported in *Pagrus auratus* (3.1 mmol L^{-1})[12], *Piaractus brachypomus* (10.80 mg dL^{-1})[14] and *Acipenser naccarii* (2.3±0.1 mmol L^{-1})[13]. Ca values were similar to those reported in *Scophthalmus aquosus* (3.49±0.11-4.43±0.10 mmol L^{-1})[7] and *Salmo salar* (3.3±0.1-4.7±1.4 mmol L^{-1})[6]. P values were higher than those from *Piaractus brachypomus* (7.29 mg dL^{-1})[14]. Cl activities were higher than values reported in *Oreochromis niloticus* (130.1±7.4 mEq L^{-1})[15], *Piaractus brachypomus* (138.7 mmol L^{-1})[14], *Acipenser naccarii* (112.9±3.5 mmol L^{-1})[13] and *Salmo salar* (141±5.3-158±2.6 mmol L^{-1})[6]. Cl values were similar to those reported in *Pagrus auratus* (178 mmol L^{-1}) [12]. Fe levels were much lower than the mean value in *Scophthalmus aquosus* (143.4±43.5 μg dL^{-1})[7].

Lipoproteins synthesized in the liver seemed to be associated with the storage sites of lipid in fish. Lipoproteins of all animals function as major carriers of lipid and other hydrophobic compounds[11]. In this research, VLDL levels were higher than the mean value in *Takifugu rubripes, Pagrus major, Seriola dumerili, Paralichthys olivaceus, Caranx delicatissimus*[11], but were similar to those reported in *Scyliorhinus canicula* (8.32±2.98 mg dL^{-1})[8]. The densities of HDL from the *Scorpaena porcus* seemed to be higher than those from *Takifugu rubripes, Paralichthys olivaceus, Pagrus major, Caranx delicatissimus* and *Seriola dumerili*[11] but were much lower than those from *Raja lintea, Raja radiata* and *Etmopterus*[4]. At the same time, HDL activities were similar to those reported in dogfish[3]. Liporoteins have been shown to differ among species[11].

Table 1: Black Scorpion fish serum chemistry values (n=72)

Parameters	Mean±SE	Minimum	Maximum
Body weight (g)	214.60±9.5151	39.49	392.79
Body length (cm)	21.95±0.375	13.20	27.50
Electroytes			
Na (mmol L^{-1})	195.07±1.7000	169.00	232.00
K (mmol L^{-1})	3.810±0.185	1.90	9.10
Cl (mmol L^{-1})	174.82±1.5600	135.00	209.00
P (mg dL^{-1})	15.122±0.2640	10.60	21.30
Ca (mmol L^{-1})	3.66±0.0707	2.80	5.00
Fe (μg dL^{-1})	15.639±0.6560	6.00	42.00
Lipoproteins			
VLDL (mg dL^{-1})	7.65±0.3800	3.00	25.00
LDL (mg dL^{-1})	15.36±1.6600	4.00	91.00
HDL (mg dL^{-1})	20.36±0.7100	12.00	46.00
Enzymes			
ALT (IU L^{-1})	28.89±2.26	8.00	93.00
AST (IU L^{-1})	224.11±14.09	35.00	695.00
Water temperature (°C)	24.00-25.00		
Water salinity (‰)	29.90-30.20		
Deep (m)	20.00-30.00		

ALT and AST belong to the non-plasma specific enzymes which are localized within tissue cells of liver, heart, gills, kidneys, muscle and other organs[22,23] and in blood plasma they may give specific information about organ dysfunction[24,25]. Heavy metal compounds, pesticides, subletal concentration of phenol and organic pollution may induce changes in blood AST and ALT activities in fish[26,27]. In this study, AST activities were lower than values reported in *Esox lucius* (252.0-583.8 IU L^{-1})[10], *Thymallus thymallus* (59.98-1199.7 IU L^{-1})[2], *Salmo trutta m. fario* (71.98-719.85 IU L^{-1})[2] and *Salmo salar* (278±73 IU L^{-1})[5] but were much higher than values reported in *Piaractus brachhypomus* (49.1 IU L^{-1})[14], *Pagrus auratus* (33 IU L^{-1})[12], *Chondrostoma nasus* (29.99-539.89 IU L^{-1})[2] and *Leuciscus cephalus* (29.99-329.93 IU L^{-1})[2]. AST activities were similar to those reported in *Oreochromis niloticus* (230.5±219.6 IU L^{-1})[15], ALT activities were higher than values reported *Esox lucius* (4.9-11.2 IU L^{-1})[10], *Salmo salar* (6 IU L^{-1})[5], *Salmo trutta m. fario* (1.19-41.99 IU L^{-1})[2], *Thymallus thymallus* (0.59-71.98 IU L^{-1})[2] and *Leuciscus cephalus* (5.99-44.99 IU L^{-1})[2] but were much lower than values reported in *Oreochromis niloticus* (96.8 IU L^{-1})[15], *Pagrus auratus* (97 IU L^{-1})[12] and *Chondrorostoma nasus* (2.39-167.96 IU L^{-1})[2]. AST and ALT values can change due to the fish species[2].

Variations between blood chemistry parameters among fish species depend on the sampling technique, analyses methods, age, habitat and diet[14]. Hence, this

study give valuable information on health of economically important fish species, Black Scorpion fish. The result of present study may also be helpful in obtaining standard values of blood parameters. Furthermore, examining blood parameters may allow us understand biological and ecological characteristics of these species.

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