

## Study on Some Blood Biochemical Parameters of Pike (*Esox lucius* Linnaeus, 1758) in Anzali Wetland

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**Abstract:** Pike has a great economic value. This fish is used in ponds of warm-water fishes. Study of blood biochemical parameters is one of the important indicators in fish. There is little understanding about the blood biochemical parameters in this fish. So, the blood biochemical parameters in pike broodstocks of Anzali wetland studied from autumn 2010 to summer 2011. Generally, 26 specimens were captured in this study. Blood samples were taken after catch of fish and the blood biochemical parameters were measured. The obtained results showed that the highest glucose levels were recorded in spring, the highest cholesterol levels were in autumn and winter and the highest total protein levels were in autumn ( $P < 0.05$ ).

**Key words:** Anzali Wetland • Pike • Glucose • Cholesterol • Total Protein

### INTRODUCTION

It is important to have adequate information about the aquatics. A careful evaluation needed to the properties of the aquatics and their environment due to increase populations on current limited resources [1]. Study of blood biochemical parameters is important for management of endangered species [2]. The elements, such as feeding regime and stocking density are a certain influence on blood biochemistry parameters [3]. The evaluation of blood biochemical parameters is important to determine the health of many vertebrates, such as fish [4-6]. The blood biochemical parameters have been showed a wide range of purposes, such as detecting cellular damage caused by toxicant exposure, infection by pathogenic agents, traumatic handling, assess the effects of diets on liver function and the osmoregulatory and ionoregulatory functions, effects of sex and maturation cycle and responses to stressors [7]. The concentrations of glucose and osmoregulatory fluctuations used as stress indicators for fish [4, 6, 8-10]. The main function of proteins is to regulate the acid-basic balance maintaining [10, 11]. Pike (*Esox lucius*) occurs in the fresh and brackish waters of Europe and North America [12]. In Iran, pike has a great economic value [1]. The abundance of pike is mean and it needs to protection. In recent years, its generation is declined due to destruction of its habitat [13]. This fish is used in ponds of warm-water fishes.

Anzali wetland is located in the South of the Caspian Sea. This wetland has great sensitivity due to ecological, botanical, zoological, limnological and biological importance and also the most important supporter of reproduction economical-fishery fish of the Caspian Sea [14].

The great studies applied on blood biochemical parameters in teleost by many researchers such as study on *Oreochromis aureus*, *O. mossambicus* and two strains of *O. niloticus* [4], *Cyprinus carpio* [15], Rainbow trout (*Onchorhynchus mykiss*) [16], Caspian lamprey (*Caspiomyzon wagneri*) [17], *Oncorhynchus mykiss* [18], Goldfish (*Carassius auratus gibelio*) [19] Persian sturgeon (*Acipenser persicus*) [20]. However, there is little understanding about the blood biochemical parameters in this fish. In this study, it was proposed to determine the amounts of glucose, total protein and cholesterol in *Esox lucius* for better understanding of blood biochemical parameters.

### MATERIALS AND METHODS

Generally, 26 specimens were captured using gillnet and fyke net in Anzali wetland, Guilan province, Iran from autumn 2010 to summer 2011. Blood samples were taken using a syringe from the caudal peduncle and taken into heparinized tubes (CBC) for determining blood parameters. Then heparinized tubes transferred to

laboratory and were centrifuged (for 15 min at 3000 rpm) and the plasma was extracted and samples were maintained in freezer -70°C for determining glucose, cholesterol and total protein. The levels of glucose, cholesterol and total protein were determined by spectrophotometer [31wap-S2000-UV/VIS, Cambridge-UK] and kits (Pars Azmoon., Iran). The concentrations of glucose, cholesterol and total protein were calculated by the following equations [21]:

$$\text{Concentrations of glucose} = \frac{\text{Sample absorb}}{\text{Standard absorb}} \times 100$$

$$\text{Concentrations of cholesterol} = \frac{\text{Sample absorb}}{\text{Standard absorb}} \times 200$$

$$\text{Concentrations of total protein} = \frac{\text{Sample absorb}}{\text{Standard absorb}} \times 6$$

The SPSS 16 software was used for data analysis. The data were statistically analyzed using one-way analysis of variance (ANOVA). When significant F-ratios were calculated by ANOVA, the Duncan test was applied to identify which means was different. Data are presented as treatment means ± SD.

## RESULTS

According to the obtained results, the mean concentration of glucose was 272.07±17.18 mg/dl (minimum 264.21 mg/dl and maximum 292.41 mg/dl) in spring, 122.76±114.34 mg/dl (minimum 20.69 mg/dl and maximum 224.83 mg/dl) in summer, 236.21±59.69 mg/dl (minimum 167.93 mg/dl and maximum 343.10 mg/dl) in autumn and 164.88±82.51 mg/dl (minimum 31.03 mg/dl and maximum 277.93 mg/dl) in winter. The highest of glucose was in spring and the lowest was in summer (Figure 1). There was significant relationship between glucose and season (P<0.05) but this process wasn't regular.

According to the obtained results, the mean concentration of cholesterol was 4.56±1.74 mg/dl (minimum 2.46 mg/dl and maximum 7.20 mg/dl) in spring, 5.44±0.47 mg/dl (minimum 5.11 mg/dl and maximum 5.78 mg/dl) in summer, 6.28±0.74 mg/dl (minimum 5.24 mg/dl and maximum 7.04 mg/dl) in autumn and 6.35±1.88 mg/dl (minimum 4.46 mg/dl and maximum 10.56 mg/dl) in winter. The highest of cholesterol was in autumn and winter and the lowest was in spring (Figure 2). There was significant relationship between cholesterol and season (P<0.05).

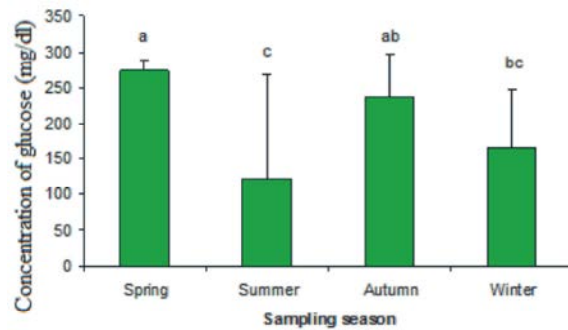


Fig. 1: The changes of glucose (mean ± SD) in pike of Anzali wetland

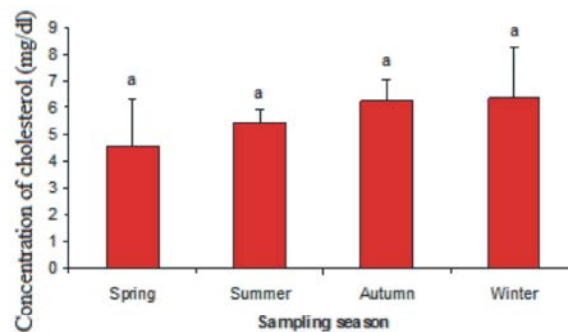


Fig. 2: The changes of cholesterol (mean ± SD) in pike of Anzali wetland

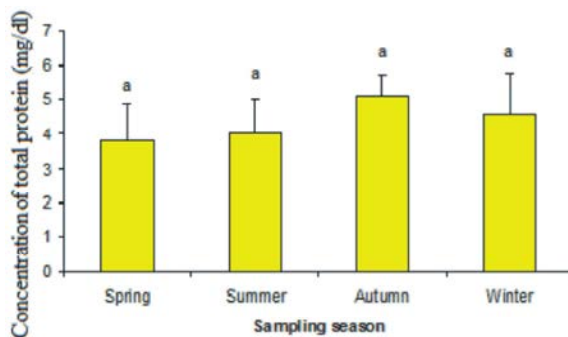


Fig. 3: The changes of total protein (mean ± SD) in pike of Anzali wetland

According to the obtained results, the mean concentration of total protein was 3.8±1.06 mg/dl (minimum 2.48 mg/dl and maximum 5.15 mg/dl) in spring, 4.04±0.98 mg/dl (minimum 3.34 mg/dl and maximum 4.74 mg/dl) in summer, 5.08±0.6 mg/dl (minimum 3.97 mg/dl and maximum 5.59 mg/dl) in autumn and 4.6±1.15 mg/dl (minimum 2.86 mg/dl and maximum 7.07 mg/dl) in winter. The highest of total protein was in autumn and the lowest was in spring (Figure 3). There was significant relationship between total protein and season (P<0.05).

## DISCUSSION

The observed differences on parameters of blood in fish depended on age, season, environment, physiological conditions of fish, infections and diseases of fish, fish activities, sex and sexual maturity of fish [22]. Biochemical parameters evaluations of blood are important for determining the fish health [5, 6]. Biochemical baselines values established may allow important clinical decisions about fish species [6, 23]. The environmental stresses are important factors that limit conditions of fish under breeding conditions [24-26]. Biological and environmental factors influence on bloody parameters of fish that must be considered for proper interpretation of results [27-30].

The variation in glucose levels was reported for fish species of different ecological habitat [31, 32]. Biochemical parameters diverge among individuals and among species, too [6] and glucose seasonal changes [8]. Based on the results, changes of glucose levels represent difference at different seasons and this process wasn't regular. This was due to glucose is one of the important parameters and should be measured immediately after sampling to avoid errors readings. So, the levels of glucose in spring were higher than other seasons. This time coincided with post-spawning. The glucose concentration depends on the fish life mode and particularly on its locomotive capacity [33].

Studies on hematology and biochemical parameters of blood in fish showed that amounts of bloody parameters can be affected by temperature changes and oxygen content of water [34]. Based on the results, the highest of cholesterol levels observed in autumn and winter when females are being maturation.

Studies showed that values of total protein in wild trout are higher than cultured trout and the reason of this difference is higher using of natural food and higher activity by wild trout [35]. Studies on values of total protein in male and female tench (*Tinca tinca*) in different seasons showed that total protein levels of male tench in autumn and winter were significantly decreased compared to spring and summer whereas total protein levels of female tench in winter were significantly decreased compared to other seasons. The seasonal changes are effective on blood components in male and female tench (*Tinca tinca*) and these changes may play a protective role in its life. In this study, the highest of total protein amounts was in autumn when females are being maturation [28]. Study on effects of age on some biochemical parameters of blood in carp showed an increase of 50% glucose and 80% total lipid in the third

year of training, whereas they didn't observed significant changes in cholesterol and total protein levels [36].

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