

Investigated of Some Serum Biochemical Factors in Female Persian Sturgeon (*Acipenser persicus*) before and After Injection of Pituitary Extract

Mahboubeh Hosseinzade, Mohammad Reza Imanpoor, Seyed Mostafa Aghilinejhad and Ali Shabani

Department of Fishery, Gorgan University of Agricultural Sciences and Natural Resources, Gorgan, Iran

Abstract: Concentration of serum calcium (Ca^{2+}), glucose (Glu), magnesium (Mg^{+2}), cholesterol (CHO) and total protein (TP) were measured before and after injection (Pituitary Preparation) PP in Persian sturgeon, *Acipenser persicus*. Two injections of PP were used to simulate final maturation in maturing female Persian sturgeon. The levels of serum Mg^{+2} and CHO in females before injection PP were higher than females after injection PP but these differences were not significant ($P>0.05$). The amount of serum Ca^{2+} in the female before injection PP was higher than the females after injection PP ($P<0.05$). The results showed that the concentration of TP and Glu in the females after injection PP was significantly higher than the before injection PP ($P<0.05$).

Key words: Persian Sturgeon • Biochemical factors • Injection PP • Cholesterol • Magnesium

INTRODUCTION

Persian sturgeon (*A. persicus*) is a benthic species occurring on sandy bottoms in the mid and southern Caspian Sea, especially along the shores of Iran [1]. This species migrates into the Caspian Rivers such as Volga and Sefidrood over March-June for spawning [2]. Each year since early March, the broodstocks are captured from the sea and transferred to propagation centers [3, 4]. The reproductive cycle of teleosts is a seasonal phenomenon which is greatly influenced by environmental factors [5]. The physiological changes associated to the morphological, histological and biochemical variations in organs and tissues directly related with this process [6].

Blood parameters are increasingly used as indicators of the physiological or sublethal stress response in fish to endogenous changes. The possibility of evaluation depends on the availability of reference values as close as possible to normal values of the various blood components considered as reliable descriptors of healthy fish under natural conditions [7].

It is important to know how blood biochemistry parameters change seasonally [8] because variations in blood biochemistry can be used to detect the health status of fish [9]. Many factors can seasonally affect blood biochemistry changes in fish such as the

reproduction cycle [10, 11], diet, temperature and photoperiod [12]. Seasonal changes in blood biochemistry have been recorded in seal [13] and fish [9, 12].

Therefore, the purpose of present study was to obtain reference values for plasma biochemical parameters and changes in concentrations of these parameters after injection PP.

MATERIALS AND METHODS

Fish and Condition: In this study 2 groups of female Persian sturgeon were investigated. Group 1 which females were captured in late winter and early spring 2012, in stage III-IV or IV (maturing phase), by gillnets from the southeastern Caspian Sea. Blood samples were taken from the caudal vein of each fish before injection PP using a nonheparinized syringe. The females before injection PP were used as group 1.

Two injections of sturgeon pituitary preparation (PP) (3-5 mg/kg) were used to simulate final maturation in maturing Persian sturgeon. The first PP injection (5% of total dose) was made at 10 PM and second (95% of total dose) 12 h later at 8 AM and blood samples were taken from caudal vein with a nonheparinized syringe 24 h after second injection. The females after injection PP (mature females) were used as females of group 2.

Blood samples were centrifuged at 3000g for 10 min and serums were frozen at -20°C until biochemical assays. Serum biochemical factors Analyses Biochemical factors (calcium (Ca²⁺), glucose (Glu), magnesium (Mg⁺²), cholesterol (CHO) and total protein (TP)) were measured for each female Persian sturgeon using a spectrophotometer (Model WAP-S2000-UV/VIS, Cambridge-UK).

Data Analysis: The statistical analysis was performed with SPSS version 16 for Windows. Data were presented as mean ± SD. Data were analyzed by T-Test to determine statically significant differences between group 1 and group 2. Assignment of data correlation was done by Pearson tests. The significant differences were determined at P<0.05.

RESULTS

The serum levels of measured parameters in female Persian sturgeon are given in Table 1.

The serum levels of Ca²⁺, TP and Glu showed significant differences between both of groups (P<0.05). There was no significant difference in levels of CHO and Mg⁺² between and (P> 0.05). The levels of serum Mg and CHO in the group 1 (female before injection PP) were higher than the group 2 (female after injection PP) but these differences were not significant. The amount of serum Ca²⁺ in the group 1 was higher than the group 2 (P<0.05).

The results showed that the concentration of TP and Glu in the group 2 was significantly higher than the group 1 (P<0.05).

There was no correlation between the serum levels of measured parameters (Table 2) (P>0.05).

DISCUSSION

Blood chemistry parameters among fish species may be affected by sampling technique, analyses methods, age, habitat and diet [14]. Therefore, reference values reported here will be useful for the early detection, identification and monitoring of diseases and sublethal conditions in this endangered species.

Electrolyte (Na, K, TP and Ca²⁺) levels indicate the operation of a variety of homeostatic mechanisms in the body [15].

The assessment of the health of animals, particularly those in captivity, often involves monitoring deviations from normal ranges of physiological values [16].

Plasma Ca²⁺ levels correlate with vitellogenin levels in teleosts [17] and elevated levels of Ca²⁺ during spawning have reported in some species. Peak levels of E2 around the start of spawning period and a subsequent decrease during spawning have been documented in a number of periodic spawners [18]. Also, Linares-Casenave *et al.* [19] stated that plasma E2 and Ca²⁺ increase during the vitellogenic phase of ovarian development in sturgeon and decrease during the final stages of oocyte maturation. In this study mean serum concentration of Ca²⁺ differ between group 1 and group 2. Actually, serum concentration of Ca²⁺ was higher in females before injection PP. In present study after injection PP and simulation final maturation in maturing female Persian sturgeon, vitellogenin was completed and subsequently, serum Ca²⁺ decrease.

Table 1: Calcium (Ca²⁺), glucose (Glu), magnesium (Mg⁺²), cholesterol (CHO) and total protein (TP) concentrations of female Persian sturgeon

	Ca ²⁺ (mg/dl)	Mg ⁺² (mg/dl)	CHO (mg/dl)	TP (g/dl)	Glu (mg/dl)
Group 1 (n=10)	2.93±0.78	3.38±0.16	254.48±64.47	2.47±0.1	78.47±0.13
Group 2 (n=10)	0.08±0.05	3.22±0.42	201.34±58.20	6.60±0.91	131.87±11.59

Values were presented as mean±SD

Table 2: The Pearson's correlations of different serum parameters in Persian sturgeon

	Parameter	CHO	Mg ⁺²	Glu	TP
Ca ²⁺	P value	0.146	0.325	0.105	0.067
	r ²	0.687	0.359	0.772	0.855
TP	P value	0.448	0.194	0.095	
	r ²	0.194	0.591	0.793	
Glu	P value	0.024	0.313		
	r ²	0.948	0.378		
Mg ⁺²	P value	0.245			
	r ²	0.495			

TP, albumin and globulin concentrations in blood plasma of fish are used as a basic index of condition and health status [20]. Kaneko [21] stated that increase of plasma proteins due to an increase in the synthesis of their own immuno- globulins as individuals grow and develop. This is a general trend in animals [22].

The cholesterol is the precursor for the synthesis of steroid hormone influencing the maturation phenomenon [23]. Shankar and Kulkarni [23] reported that the CHO content of the ovary and liver increased during breeding phase and maximum tissue content of c CHO noticed during this phase. Also, in *Heteropneustes fossilis* [24] lowest CHO levels was observed during maximal gonadal activity and highest during breeding phase indicating that the CHO content is gonadotrophin dependent. The lowest levels of c CHO were attributed to its utilization in steroid hormone synthesis. Diwan and Krishnan [25] stated that during the spawning time the serum CHO level was reduced significantly in both male and female fish. Collectively, these results are in agreement with our work, as the serum CHO level decreased during maturation. The probable explanation is that the higher CHO reserves in the maturing gonad may be the precursor store reserves which would be utilized during the stage of functional maturity. Svoboda *et al.* [20] found that the lowest concentration of the Glu and the CHO in female were obtained 2 months before reproduction. Furthermore, the determination of Glu concentration in blood serum is widely used as an indicator of stress in fish [26] and hyperglycemia is associated with stressful conditions [27]. Also, Svoboda *et al.* [20] reported that for the assessment of fish stress, the determination of Glu concentration in blood plasma was used, as well as cortisol concentration in some cases.

The data resulting from this study are the only reference values described for Persian sturgeon so we hope that this investigation will provide good basic information for future studies in this species.

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