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Short Paper

The effect of sexuality on some haematological parameters of the yellowfin seabream, *Acanthopagrus latus* in Persian Gulf

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Summary

Acanthopagrus latus is one of the major commercially exploited species in the Persian Gulf. In recent years, it has gained importance as a candidate for aquaculture. Haematological parameters of wild-caught specimens were studied during the pre-spawning period to determine if they are influenced by the sex of fish. Blood samples were collected from 55 Fish (30 female and 25 male) captured from the Musa Creek in the north-west Persian Gulf. RBC counts were higher in male than in female fish ($P<0.05$) and other parameters such as WBC, Hct, Hb, MCV, MCH, MCHC and leukocyte differential count did not show a significant difference between male and female fish.

Key words: Persian Gulf, *Acanthopagrus latus*, Haematology, Sex

Introduction

Haematologic assessment is an important tool for evaluation of fish physiological status such as other domestic animals (Kori-Siakpere *et al*., 2005). Analysis of haematological characteristics for detection of stress or disease is a common practice. Fish blood parameters vary in different species and the individual variation has also been reported, which could be attributed to genetic variation, nutritional status, sex, age, stress caused by capture, handling and sampling procedures (Kori-Siakpere *et al*., 2005). Hence, it is necessary to establish normal values as different parameters can affect haematologic parameters of fish. One of these parameters is sex (Mulcahy, 1970; Joshi, 1980).

Acanthopagrus latus (Subfamily: Sparidae) is a protandrous hermaphrodite fish distributed in southern Japan, southeastern China, Taiwan, southeastern Asia, the Persian Gulf and Australia and in the Indian Ocean to southeastern Africa (Hayashi, 1993). It is also one of the leading fish species with high mariculture potential in the Persian Gulf. Effect of pollutants on fish blood has been studied (Hedayati *et al*., 2010; Hedayati *et al*., 2011; Hedayati, 2012), but haematologic characteristics have not been succinctly documented. Therefore, this study was done to catalogue the basic values of *A. latus* in order to establish any statistical variability between male and female in a population subjected to the same environmental conditions.

Materials and Methods

Fifty five *A. latus* were captured from the Musa Creek (north-west Persian Gulf) during the pre-spawning months (October-December). Careful netting and handling was implemented to minimize stress. The specimens were anesthetized with clove oil

and the peripheral blood was collected by puncture of the caudal vein with a heparinized syringe. Fish were weighed and measured and blood was sampled from the caudal vein with heparinized syringes. After sampling, the fish was killed by a sharp blow to the head and sex was determined according to histomorphology of gonads. Thirty were females (total length 25.58 ± 3.52, weight 349.1 ± 126.27) and 25 were male (total length 23.99 ± 2.63, weight 258.01 ± 128.10). Blood samples were transferred at 4°C to laboratory for analysis. RBCs and WBCs were manually counted after dilution with Natt-Herrick's. Hematocrit value was determined by the standard microhematocrit method. Hb was determined by cyanomethemoglobin method (Mostaghni *et al*., 2005). A differential white cell count was done with giemsa stained blood smear to determine the number of different types of WBC. Each sample was analysed in duplicate. Mean corpuscular hemoglobin (MCH), mean corpuscular hemoglobin concentration (MCHC) and mean corpuscular volume (MCV) were calculated by standard formula (Coles, 1986). Data are expressed as mean±SE. Differences in haematological parameters between male and female fish were statistically analysed by Student's t-test.

Result

The mean values, standard error and range of haematologic parameters are summarized in Table 1. The haematological profile of *A. latus* indicated a significant difference (P<0.05) in RBC counts between male and female. RBC counts were higher in males compare to females but this pattern was not recorded for other RBC related parameters such as Hb and Hct. WBC counts did not show any significant difference between male and female fish. In differential counts of WBCs eosinophil and basophil were not observed in blood smear. Other WBCs did not show a significant difference between male and female.

Discussion

There is a growing interest in the study of haematological parameters of fish as an important tool in assessing the physiological conditions for aquaculture purposes. This study showed the normal values of haematologic parameters of *A. latus* in the wild during the pre-spawning period. Dacie and Lewis (1991) believed gender has a great influence on haematology of fish and included it among factors influencing fish haematology. There are reports of sex-related differences in haematologic parameters of fish (Gabriel *et al*., 2004; Akinrotimi *et al*., 2007). Sex could be associated with differences in blood cell constituents that could be caused by higher metabolic activity of male versus female fish (Collazos *et al*., 1998). The RBC count and related parameters were higher in male cyprinid fish (Orun *et al*., 2003). Number of RBCs in *A. latus* was similar to values

Table 1: Hematological and biological parameters in male and female *A. latus*. Values are given as mean±SD. Different letters denote significant differences (P<0.05) between treatments

Parameters	Mean±SD		Max		Min	
	Male	Female	Male	Female	Male	Female
Weight (g)	285.01±128.1	349.1±169.27	690	796.94	182.7	191.43
Total length (cm)	23.99±2.63	25.58±3.52	30	34	20	21
RBC ($\times 10^6$ mm^3)	3.37±0.6[a]	3.02±0.67[b]	4.69	5.46	2.55	2.09
WBC ($\times 10^3$ mm^3)	5.72±1.99	5.45±1.89	9.75	9.5	3.75	2.5
Hemoglobin (g/dL)	6.76±2.83	7.74±3.83	12.51	14.95	2.68	2.12
Hematocrit (%)	31.18±5.41	29.07±5.96	38.46	42	19.35	18.18
MCV (nm^3)	93.69±25.16	95.32±32.87	123.68	167.59	53.53	46.77
MCH (p.g)	20.54±9.53	26.20±13.71	38.5	53.83	8.53	6.53
MCHC (g/dL)	23.01±11.68	30.52±16.58	48.45	65.81	8.62	8.81
Lymphocytes (%)	72.87±4.64	74.22±6.60	79	80	65	64
Neutrophils (%)	19.62±3.29	17.28±1.97	23	20	15	15
Monocytes (%)	7.51±2.5	8.5±2.51	11	11	5	5

reported for *Rhamdia quelen* (Borges *et al*., 2004), *Dicenrarchus labrax* L. (Ozretic *et al*., 2001) and *Cichlasoma dimerus* (Vazquez and Guerrero, 2007), but higher compared to *Anguilla anguilla* (Sahan *et al*., 2007) and *Brycon amazonicus* (Tavares-Dias *et al*., 2008).

Hb and Hct values for the *A. latus* in the present study were higher than reported for *Heterotis niloticus* (Fagbenro *et al*., 2000) and obtained for *Parachanna obscura* (Kori-Siakpere *et al*., 2005), but lower than *C. gariepinus* (Sowunmi, 2003) and *Synodontis membranacea* (Owolabi, 2011). Hemoglobin content is affected by endogenous factors such as age and general condition of the fish and also exogenous factors, handling, transport and sampling (Kori-Siakpere *et al*., 2005) that make it difficult to compare results.

In fish, as in other vertebrates, WBC count is frequently used as indicators of health status. These cells are key components of innate immune defense and are involved in the regulation of immunological function in the organism (Ballarin *et al*., 2004). WBC values did not show a significant difference between male and female fish. Differences in the WBC counts could be attributed to biotic (age, maturity, sex, pathogens) and abiotic (water temperature, pH, dissolved oxygen content) factors and in particular to stress (Pavlidis *et al*., 2007).

Lymphocyte and neutrophil constituted the most peripheral WBCs like other reports in Tilapia zilli (Ezzat *et al*., 1973) and *Oreochromis aureus* (Silveira and Rigores, 1989). Eosinophils and basophils were not observed in blood smear. Absence of eosinophils and in particular basophils, has been reported in some species (Rowley *et al*., 1988).

Our findings showed that there is a similarity between haematologic indices in male and female *A. latus*, but complementary studies such as cyto-chemistry and ultra structure should be done.

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