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European Journal of Experimental Biology, 2016, 6(1):22-25

ISSN: 2248 –9215
CODEN (USA): EJEBAU

Blood components and properties of Starling

Faris A. Al-Obaidi

Iraq Natural History Research Center & Museum, University of Baghdad, Baghdad, Iraq

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ABSTRACT

The objective of this study was to determine some blood components and properties of native or common Starling *(Sturnus vulgaris L.). A total of fifty two (26 males and 26 females) individuals of* Starling *were collected from many regions of Baghdad city during 2014, half the number were collected at Winter and the other half were collected at Summer. Samples of 1.0 ml of whole blood were taken from the wing vein from individuals to determinesome blood components and properties for each sex within species. Results revealed that the average values of PCV, red cell count, white cell count, hemoglobin concentration and H/L ratio of Starling male were 36.96%, 4.28 X 10^6/m, 23.52 X 10^3/ml, 9.94 mg/100gm and 0.38 respectively during Winter and 35.88%, 3.77X 10^6/m, 23.26X 10^3/m, 8.17 mg/100gm and 0.37 respectively during Summer, whereas the average value of Starling female were 36.71%, 4.11 X 10^6/m, 23.57 X 10^3/ml, 9.80 mg/100gm and 0.39 respectively during Winter and 35.72%, 3.53X 10^6/m, 23.26X 10^3/m, 8.10 mg/100gm and 0.37 respectively during Summer. Protein, uric acid, cholesterol and lipid concentrations were 5.76, 5.11, 186 and 4.12 respectively during Winter and 5.29, 4.78, 212 and 3.81 mg/100gm respectively during Summer for Starling male and 5.84, 5.12, 186 and 4.23 respectively during Winter and 5.40, 4.82, 217 and 3.89 mg/100gm respectively during Summer for Starling female.Statistical analysis revealed Significant differences (P<0.05) in the average values due to sex and season.*

Keywords: Starling, *Sturnus vulgaris*, Blood components, Properties, Enzymes, Baghdad.

INTRODUCTION

Starlings are belong to the Old World birds, which are native to Europe, Asia and Africa [1]. Common Starling (*Sturnus vulgaris* L.) is one of the native birds in Iraq. Its small to medium-sized passerine bird in the family of Sturnidae. The name "Sturnidae" comes from the Latin word for starling, *sturnus*. Many Asian species, particularly the larger ones, are called mynas, and many African species are known as glossy starlings because of their iridescent plumage [2 , 3].

During breeding season, the large winter flocks of common Starlings break up into pairs or small groups. The nest is an untidy cup of grasses, leaves, twigs and items of human rubbish. Nest sites are any type of hollow, such as tree hollows and house roof voids. The birds are aggressive when competing for nesting sites and readily drive out native species. The pale blue eggs are incubated by both sexes which also raise the young birds. Often two broods are raised in a season [4].

Breeding takes place during the spring and summer. Following copulation, the female lays eggs on a daily basis over a period of several days. If an egg is lost during this time, she will lay another to replace it. There are normally four or five eggs that are ovoid in shape and pale blue or occasionally white, and they commonly have a glossy appearance. The color of the eggs seems to have evolved through the relatively good visibility of blue at low light levels. The egg size is 26.5–34.5 mm in length and 20.0–22.5 mm in maximum diameter.Incubationperiods may

lake thirteen to fourteen days, both parents share the responsibility of brooding the eggs, but the female spends more time incubating them than does the male, and is the only parent to do so at night when the male returns to the communal roost. Starling eggs are Altricial species class, so the young are born blind and naked [3 , 5].

The aim of this study was to determine some blood components and properties of native Starling in Baghdad city during two seasons, Winter and Summer.

MATERIALS AND METHODS

Birds collection: A total of fifty (25males and 25 females) individuals of Starling (*Sturnus vulgaris* L.) were collected from many regions of Baghdad city during 2014, half the number were collected at Winter and the other half were collected at Summer.

Blood collection: Samples of 1.0 ml of whole blood were taken from the wing vein on the inside of the elbow joint from individuals. The bird was held with its back downward and the wing laterally spread. Removal of a few feathers made the vein visible [6]. Whole blood was drawn from each bird by an insulin syringe needle and put in a 10ml test tube until to clotting. The blood was centrifuged for 5 min. The serum was removed by a transfer pipette to clean test tube and frozen.

Blood cellular components: Traits included in this study were packed cell volume (PCV) was determined according to Archer [7], red blood cell count (RBC) and leucocytes or white blood cell count (WBC) were determined according to Natt and Herrick [8], hemoglobin concentration (Hb) according to Varley *et al.* [9]. Differential leucocytes count was determined using Wright-Giemsa stain [10] and heterophils to lymphocytes ratio (H/L) estimated according to Burton and Guion [11].

Blood biochemical properties: Traits included were plasma total proteins which was determined by using colorimetric method described by Gornall *et al*. [12], uric acid was determined according to Henry *et al*. [13], cholesterol was determined according to Franey and Elias [14] and plasma lipid was determined according to AOAC [15].

Blood enzymes activity: The activities of GOT, GPT and AP in blood serum were determined photometrical using commercial Bio-test kit (RANDOX).

Statistical analysis: Data were analyzed by using the General Linear Model Procedure of SAS [16]. Means were compared by the Duncan's Multiple Range test at 5% probability [17].

RESULTS AND DISCUSSION

Blood cellular components: The average values of PCV, red cell count, white cell count, hemoglobin concentration and H/L ratio of Starling male were 36.96%, 4.28 X 10^6/m, 23.52 X 10^3/ml, 9.94 mg/100gmand 0.38 respectively during Winter and 35.88%, 3.77X 10^6/m, 23.26X 10^3/m, 8.17mg/100gm and 0.37respectively during Summer, whereas the average value of Starling female were 36.71%, 4.11 X 10^6/m, 23.57 X 10^3/ml, 9.80 mg/100gm and 0.39 respectively during Winter and 35.72%, 3.53X 10^6/m, 23.26X 10^3/m, 8.10 mg/100gm and 0.37 respectively during Summer (Table 1). Statistical analysis revealed Significant differences ($P<0.05$) due to sex and season.

Blood Biochemical properties: Protein, uric acid, cholesterol and lipid concentrations were 5.76, 5.11, 186 and 4.12 respectively during Winter and 5.29, 4.78, 212 and 3.81 mg/100gm respectively during Summer for Starling male and 5.84, 5.12, 186 and 4.23 respectively during Winter and 5.40, 4.82, 217 and 3.89 mg/100gm respectively during Summer for Starling female (Table 2). Statistical analysis revealed Significant differences ($P<0.05$) in the average values due tosex and season.

Blood enzymes activity: Significant differences ($P<0.05$) were found in blood GOT, GPT and ALP activities due to sex and season. The average values of male were 92, 8.6 and 34.2 U/l respectively during Winter and were 99, 10.5 and 35.7 U/l respectively during Summer, whereas the average values of female were 95, 8.9 and 34.9 U/l respectively during Winter and were 105, 10.8 and 36.9U/l respectively during Summer(Table 3).

It is well known that hematological parameters in birds vary due to sex, season, time of sampling and according to some authors, even due to nutrition [18]. We found most of the differences between males and females in all parameters related to red blood cells (PCV, RBC and Hb). Males showed significantly higher values than females in most parameters, which conforms to similar findings in many avian species [19]. We assumed that the reason for the

difference is a higher level of estrogens in blood of female birds, which reduces the values of red blood cell count. At the same time an opposite effect is caused by testosterone in males [20], also the significantly increased of cellular blood parameters in males occurred during the period of growth and decreased during the period of reproductive activity [21].

Table 1. Blood cellular components of Starling

Season	Sex	PCV (%)	RBC (X 10^6/ml)	WBC (X 10^3/ml)	Hb (gm/100ml)	H/L ratio
Winter	Males	36.96 ±1.74a	4.28 ±0.51a	23.52 ±1.09a	9.94 ±0.85a	0.38 ±0.03a
	Females	36.71 ±1.79b	4.11 ±0.50b	23.57 ±1.10a	9.80 ±0.86b	0.39 ±0.03a
	Average	36.84 ±1.77 A	4.20 ±0.51 A	23.55 ±1.10 A	9.86 ±0.84 A	0.38 ±0.02 A
Summer	Males	35.88 ±1.71a	3.77 ±0.52a	23.26 ±1.08a	8.17 ±0.86a	0.37 ±0.04a
	Females	35.72 ±1.73b	3.53 ±0.52b	23.26 ±1.10a	8.10 ±0.87b	0.37 ±0.05a
	Average	35.75 ±1.75 B	3.65 ±0.51 B	23.26 ±1.10 B	8.14 ±0.87 B	0.37 ±0.04 A

Different letters among columns revealed significant differences (P<0.05), large letters between season and the small letters between sex.

Table 2. Blood serum biochemical properties of Starling

Season	Sex	Protein (mg/100gm)	Uric acid (mg/100gm)	Cholesterol (mg/100gm)	Lipid (mg/100gm)
Winter	Males	5.76 ±0.37b	5.11 ±0.44a	186 ±1.62b	4.12 ±0.40b
	Females	5.84 ±0.33a	5.12 ±0.46a	180 ±1.69a	4.23 ±0.41a
	Average	5.80 ±0.34A	5.12 ±0.45A	183 ±1.64B	4.18 ±0.40A
Summer	Males	5.29 ±0.35b	4.78 ±0.46a	212 ±1.67b	3.81 ±0.42b
	Females	5.40 ±0.36a	4.82 ±0.44a	217 ±1.66a	3.89 ±0.42a
	Average	5.35 ±0.34B	4.80 ±0.45B	215 ±1.68A	3.85 ±0.41B

Different letters among columns revealed significant differences (P<0.05), large letters between season and the small letters between sex.

Table 3. Blood serum enzymes activity of Starling

Season	Sex	GOT (U/l)	GPT (U/l)	ALP (U/l)
Winter	Males	92 ±1.34b	8.6 ±0.56b	34.2 ±1.11b
	Females	95 ±1.37a	8.9 ±0.52a	34.9 ±1.17a
	Average	94 ±1.37B	8.8 ±0.54B	34.5 ±1.16B
Summer	Males	99 ±1.35b	10.5 ±0.55b	35.7 ±1.15b
	Females	105 ±1.32a	10.8 ±0.54a	36.9 ±1.15a
	Average	102 ±1.35A	10.7 ±0.43A	36.3 ±1.16A

Different letters among columns revealed significantdifferences (P<0.05), large letters between season and the small letters between sex.

The values were in agreement with the findings of Pampori and Saleem [22] and Mary and Gomathy [23]. Numerically lowerblood cellular components and properties during Summer in the present study may be due to the hot temperature in Summer compared with Low temperature during Winter. This might have resulted in changes in blood volume due to hemodilution in Summer and low blood viscosity [19 , 24].

Serum transaminase enzymes of glutamicoxaloacetic acid transaminase (GOT), which also called Aspartate aminotransferase (AST) and glutamic-pyruvic acid transaminase (GPT) are type of enzymes that help produce chemical reactions in the body. It is found mainly in the blood but also in certain body tissues, especially the heart and the liver. Alkaline phosphatase (AP) is present in nearly all tissues and organs, in particular liver and in bones, where it is associated with osteoblastic processes. In avian and poultry, females have consistently higher values for GOT, GPT and AP compared to males [19 , 25].

All heat-stressed birds displayed systemic inflammation and activated biochemical markers included increased plasma levels of blood glutamic oxaloacetic transaminase, glutamic pyruvic transaminase and alkaline phosphatase; increased levels of glutamate, glycerol and lactate/pyruvate ratio; and decreased striatal levels of partial pressure of oxygen and local cerebral blood flow, which were all observed during heat stress [26]. High environmental temperature, causing hyperthermia, leads to a sequence of physiological and metabolic changes resulting from the need to cool the body temperature or a sequence of metabolic events originated from the hyperthermia. In the birds, as well as other animals, one way of cooling the body is accomplished by panting and evaporative cooling, with eventual loss of carbon dioxide and development of respiratory alkalosis [27].

The increased activities in renal enzymes, following a long-term hyperthermia, include alkaline phosphatase, probably because of having an important role in the kidney function. This change could be associated with the increased of metabolic activities required to adjust blood pH, compensating and neutralizing the developing respiratory alkalosis caused by panting and hyperventilation in the process of cooling the body [26 , 28].

CONCLUSION

To our knowledge only very few studies about Starling in Baghdad, to determine the variation amongpopulations in blood components and properties, so this results will provide a new data for Ornithologists in Iraq.

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