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Original Article

Haematology of Grey Heron (*Ardea cinerea*) and Black Crowned Night Heron (*Nycticorax nycticorax*)of Chilika Wetland

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Abstract

A study of the haematological profile of two common resident heron species of Chilika wetland(Asia), namely black crowned night heron and grey heron was undertaken during their wintering period to record the baseline data on haematology of these two species in the region. Significant differences were noted in blood parameters like haemoglobin concentration, total WBC count, PCV, thrombocyte count and MCHC between the two heron groups. However, no significant variation was noticed in parameters like total RBC, MCV, MCH and differential leucocyte count. It was observed that the night heron showed higher values for most of the parameters in comparison to grey heron.

Keywords: Ardeidae; Haemogram; Leucogram; Wading Birds.

Introduction

Herons belong to the family Ardeidae along with other members like egrets.They have an extensive range of distribution throughout the temperate regions especially the wetland habitat where they enjoy the status of 'Least Concerned' as declared by the International Union of Conservation of Nature and Natural Resources (IUCN). Hunted down extensively in the 19th century either in the lieu of being a prized delicacy for human consumption or for their ornamental plumes to be used as fashionable human adornments, they suffered mass extinction in many parts of Europe and this led to laws for their conservation in those regions. The members are mostly residents or semi-migratory in nature and are one of the widely distributed populous avian species with top feeding positions to be found in most of the wetland ecosystems.

In 1960s black crowned night heron population showed decline around Michigan(USA), reportedly due to presence of excessive amount of DDT in water [2]. The same species has shown decline in 1970s in northeastern US estuaries [14] and again in 1990s due to contaminants and habitat destruction [3]. The status of the population of herons and egrets has been proved to be an important factor for the assessment of overall environmental wellbeing. Thus, these birds occupy a sensitive yet strategic position in their ecosystem. Along with other assessment methods like habitat and population studies, non-invasive and effective faster health assessment tools like haematological analysis are also important for wildlife studies. However, being categorised as least concerned, the members of this family perhaps fail to draw attention in this respect and thus, very few literature is available on haematology of herons and egrets [5,8,12] . Most of the studies conducted are on other popular species having either economic importance or having a threatened existence [15,18]. Moreover, no proper haematological data are on record for grey herons except a few [10,13]. A recent study on grey heron has shown that blood is the fourth tissue after feather,liver and kidney to show a higher concentration of mercury contamination[10] thus, emphasizing the importance of studying base line values of blood parameters , as an important tool for overall assessment of the health of a

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population and its environment.This study has been undertaken on two common yet important resident wading birds of Chilika, namely black crowned night heron and grey heron with an assumption that the blood value of these avian species may serve as an indicator of the wellbeing of the wetland.

Materials and Methods

The site of this study was Chilika lagoon which is located between the coordinates of 19º 28' and 19º 54'N and 85º 05'and 85º 38' E and is a part of Odisha state in the eastern coasts of India.It enjoys the status of being world's second largest brackish water lagoon and the 1st Ramsar site of India.It hasbeen declared to be an wetland of international importance by the Ramsar convention in 1981.It is a favourite wintering destination for many migratory and semi-migratory birds as well as a host to many breeding resident bird species [1]. Out of the 71 reported resident avian species, family Ardeidae contributes 14 species of herons and egrets [6].

The grey heron is a large predatory wader,having long yellowish brown legs, an 's' shaped long neck with black-brown stripes, grey feathers covering the upper part of the body, while under part being white and characteristic pinkish yellow beak (Figure 1). It is a diurnal feeder showing solitary foraging habit mostly depending upon aquatic insects,fish, amphibians, small mammals as their food. These birds are active mainly during day time and are found to be aggressive defenders of their nesting and feeding territories. In contrast to other herons, black crowned night heron is a small size bird with shorter legs,neck and a stocky hunched posture.It is a nocturnal species having characteristic large and widely separated red eyes for night vision (Figure 2). They have been known to fly with faster beating wings in comparison to other herons. They are solitary foragers like grey herons, maintaining exclusive feeding territories and showing similar diet with an additional propensity to eat young birds, which is unusual among herons.

Blood samples were collected from 10 non-breeding , adult, black crowned night herons and 10 grey herons during the month of February and March in the year 2015. The blood samples were collected between 6.00 a.m. and 9.00 a.m. in the morning in all cases to avoid diurnal variation. Clinically sound adult birds were captured using nets from their nests and blood samples were collected by venepuncture of the ulnar vein by trained veterinary professionals.The blood collected using 2.5ml disposable syringes was immediately stored in EDTA vials in ice box. Few drops of fresh blood was used to prepare the bloodfilms on the site. The anti-coagulated samples were taken to the laboratory at adistance of three hours, for further study within 24 hours of sample collection following standard procedure[16]. Haemoglobin concentration was estimated using Sahli's Haemoglobinometer and PCV was estimated by microhaematocrit method running the sample at 2500 rpm in centrifuge for 15 minutes.Total RBC, WBC and thrombocyte [4,17] counting were done with the help of Neubaurer's haemocytometer.The mean corpuscular volume (MCV), mean haemoglobin concentration (MCH) and mean corpuscular haemoglobin concentration (MCHC) were calculated using standard formulae [3]. For the DLC, blood smears were stained in Romanovsky stain (Leishman's Stain). WBCs were counted and classified according to their staining and morphologic properties [16]. The data was analysed in MS Office Excel 2010 and were presented as Mean ±SE(standard error).Further, Student's t-test was performed assuming equal variance and the differences were considered significant at $p < 0.05$,$p < 0.01$ and $p < 0.001$.

Results

The haemogram and leukogram of avian species vary in response to factors like age, species, hormonal, physiological, pathological and environmental influence apart from handling and blood collection procedures [17].

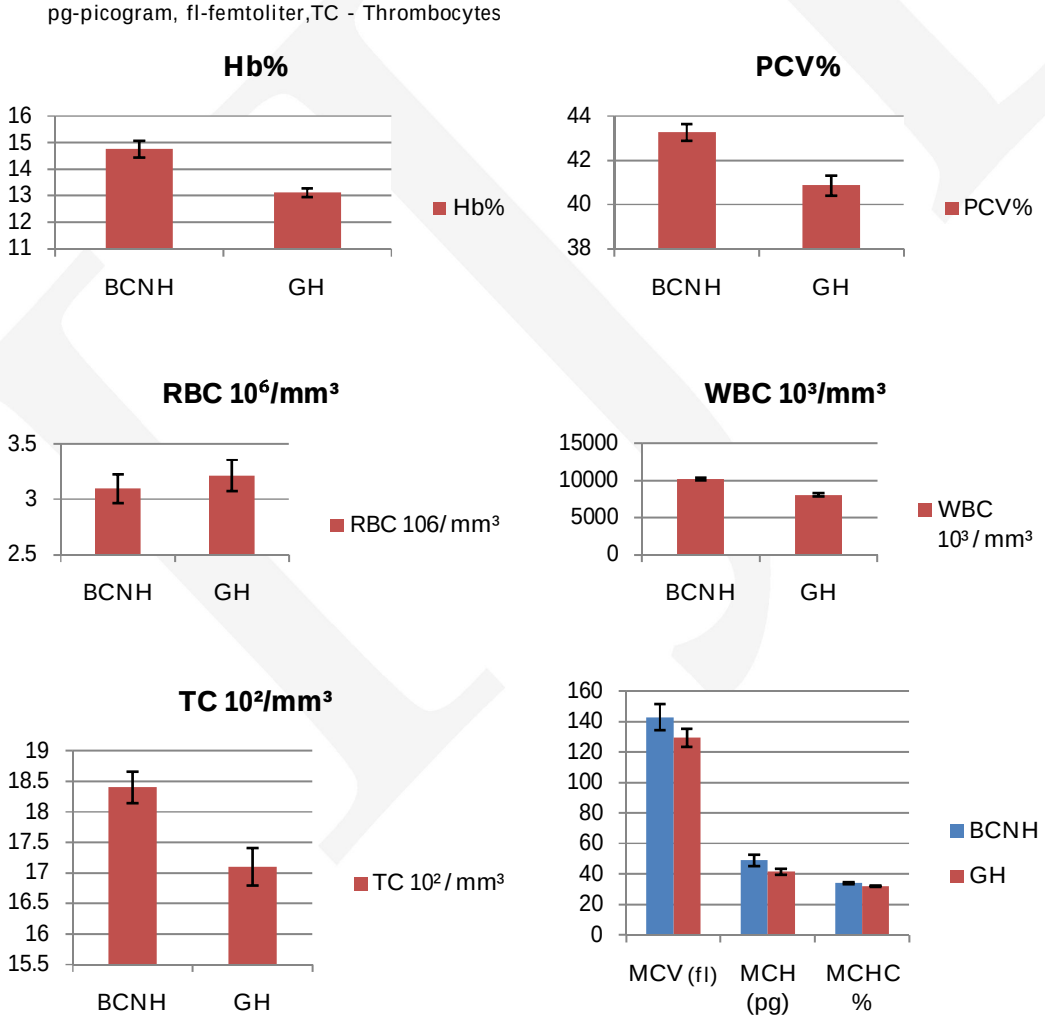
Significant difference was found between the two heron species for some of the parameters like PCV, Hb, WBC, thrombocyte count and MCHC. While, in others like RBC, MCV, MCH and differential leucocyte count the difference was non-significant. The parameters in case of black crowned night herons were visibly higher than those of grey herons. Hob concentration for night heron was 14.77± 0.31 but was 13.12 ± 0.31 for grey heron, the difference was found to be highly significant. Similarly, PCV was recorded as 43.26 ±0.38 for black crowned night heron while it was 40.87 ±0.46 for grey heron. The total thrombocyte per mm^3 blood was also higher in black crowned night heron having a value of 18.4±0.26 in comparison to that of grey heron which is 17.1±0.31.This difference was significant. Black crowned night heron also showed higher number of WBC, 10190±183.75 in comparison to the total WBC for grey heron, 8071±201.8.Heterophils were found to be predominant leucocytes followed by the lymphocytes in both the birds.The difference between

the percentage of the five types of leucocytes was recorded to be no significant. The MCV and MCH value of black crowned night heron which are 142.96±8.5 and 49.06±3.6 respectively were higher than those of grey heron. However, the difference was nonsignificant. The MCHC of night heron (34.12±0.54) showed significant difference with that of grey heron (32.1±0.49) (Table 2 and Fig. 3).

Table 1: Haematological parameters in black crowned night heron and grey heron

S. No	Parameters	Black Crowned Night Heron(10)	Grey Heron(10)	p- value
1	Hb(g/dL)	14.77 ± 0.31	13.12 ± 0.15	0.0005***
2	PCV(%)	43.26 ± 0.38	40.87 ± 0.46	0.003***
3	RBC(10^6/mm^3)	3.09 ± 0.13	3.21 ± 0.14	0.94 NS
4	WBC(10^3/mm^3)	10.190 ± 0.18	8.071 ± 0.2	3.3E-06
5	TC(10^3/mm^3)	18.4 ± 0.26	17.1 ± 0.31	0.01**
6	MCV(fl)	142.96 ± 8.5	129.49 ± 5.9	0.54 NS
7	MCH(pg)	49.06 ± 3.6	41.56 ± 1.8	0.1 NS
8	MCHC(%)	34.12 ± 0.54	32.1 ± 0.49	0.05*
9	Heterophil(%)	61.8 ± 1.12	61 ± 1.8	0.5 NS
10	Lymphocyte(%)	33.6 ± 1.2	33.8 ± 1.9	0.7 NS
11	Eosinophil(%)	2.7±0.21	2.8±1.6	0.8 NS
12	Monocyte(%)	1.6±0.37	1.6±0.22	1.0 NS
13	Basophil(%)	0.3±0.15	0.4±0.16	0.3 NS

Note: Values given as Mean± Standard Error (SE). Parameters showing significant difference * at p<0.05 ,**at p<0.01 ,***at p<0.001. NS-non significant.



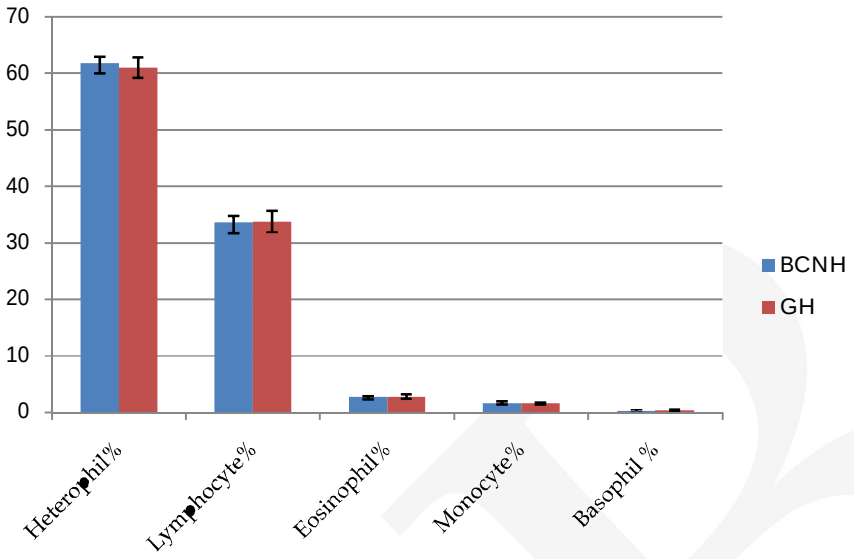


Fig. 3: Comparative account of different haematological parameters between black crowned night heron (BCNH) and grey heron(GH) shown by standard error bars

Fig. 1: Grey heron (*Ardea cinerea*)

Fig. 2: Black crowned night heron (*Nycticorax nycticorax*)

Discussion

The present study shows results similar to those reported by other studies [5,8,13]. This study indicates a slightly lower PCV, MCV, heterophil and lymphocyte value but higher value of RBC, WBC and MCHC for black crowned night heron in comparison to that reported by Celdran et al. [5]. The difference noted may be due to difference in the season of study or reproductive and physiological status of the birds or environmental conditions like temperature, availability of food etc.[7,9,11]. The difference may also be due to the fact that earlier reports were on captive herons[4] whereas the present study projects the blood values of wild free living herons.

The difference in value of Hb,PCV,WBC ,thrombocyte count and MCHC between the two species may be due to several factors like metabolic status, nocturnal or diurnal habit[17], feeding habit, age and sex [9]apart from their taxonomic position and genotype [7]. For instance, black crowned night heron is nocturnal in nature and with a higher metabolic rate at night which may be reflected in their higher haematological value in samples collected early morning in comparison to grey herons which are diurnal and supposedly show a higher metabolism during day time.

Hb concentration is an index of the quantity of haemoglobin per unit volume of blood and is always proportionate to haematocrit.In this study, the Hb value was found to be 14.77 and 13.12 for the two herons which falls within the normal range of avian Hb concentration 11-16 mg/dL.PCV is the quickest

method for evaluating the red cell mass and normal range for avian species has been calculated to be 35%-55%. PCV value less than this range is assumed to be the indictor ofan anaemic condition where as a higher value outside this range may indicate dehydration or polycythaemia [17]. These results (43.26% and 40.87%) indicate that the birds taken for study were neither anaemic nor dehydrated. This is also supported by the MCV value (142.96 and 129.49) which falls within the normal range of 90-200fl.A similar conclusion may be drawn about these results with respect to MCH and MCHC values as they are in normal range [17]. Thrombocyte concentration of most avian species [17] studied ranges between 20 to30 (10^3 / mm^3). In the present study, it was recorded to be 18.4 and 17.1 for the two herons.No other study was found to have reported on thrombocyte count of herons.The leucogram in birds covers a broad range as it often varies widely even between normal birds of the same species.Though H:L ratio has been conventionally used as a parameter of stress in birds, many birds including the herons and egrets show a higher percentage of heterophils than lymphocytes. Moreover, birds that normally have greater number of heterophils, show less drastic change in stressful conditions [17]. This fact also is in support of the differential leucocyte count found in the present study which comes within the ranges reported normal in other studies [5]on herons.

Conclusion

Herons are an important group of birds in any wetland ecosystem.Being one of the major avian groups at the tertiary trophic level in an ecosystem as well as having a noticeable wide spread population by virtue of their breeding success, health of their heronries may easily reflect any alteration in biotic or abiotic components of the ecosystem , whether natural or induced by human activities.Thus, they may play a key role in studying the wellbeing of their environment.This study is an effort to record haematological data of two common wading species of the Chilika wetland which may be useful for future reference in ecological,wildlife as well as veterinary purposes.

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