

# Some Haematological Observations in *Columba Livia* Due to *Haemoproteus* Infection



Nasim Jahan, Ramesh Chandra, Mohd Shoeb

**Abstract:** Birds contribute indirectly to human welfare as majority of them feed on insects and rodents and some are efficient scavengers. Poultry farming is a leading profession which provides nutritive food products for human consumption. However, these valuable resources can be infected with a wide range of blood parasites which may affect their survival and existence. In this study, the impact of *Haemoproteus*, an intracellular sporozoan parasite of the common pigeon. *Columba livia* on some haematological parameters (Hb% and TEC) was examined. The investigations were conducted in two groups of *Columba livia*. Group A: Control, Group B, *Haemoproteus* infected. The Hb values (13.410.17gm/100ml) in Group A decline to (10.8±0.37 gm/100ml) in Group B. TEC in Group B also declined to 1.620.05x10<sup>6</sup>/Cmm from the normal values of 2.19±0.02x10<sup>6</sup>/Cmm in Group A. The fall in Hb% was 18.97% and that in TEC was 24.2%. The values of TEC are more affected (24.2 %) as compared to Hb (18.97%). Being an intracellular parasite, the metabolism of *Haemoproteus* appears to be directly associated with the cells.

**Keywords:** *Columba livia*, Haematological Parameters, *Haemoproteus* Infection

## I. INTRODUCTION

Hematology offers a potentially valuable tool in the veterinary care of birds. Haematological data in the literature on avian physiology are based on domestic species mainly fowl and chickens (Board and Harnsey 1978, Hodges 1979, Dieterlen-Lieure, 1988). Haematological values and blood chemistry for wild birds appear only sporadically but a complete listing of the major parameters for nondomestic species is not available. Instead, haematological norms of domestic fowl are often relied upon for clinical and physiological evaluation of wild birds. Haematological values vary among species and are influenced by other factors including physiological conditions, (Altman and Dittman, 1964; Dolnik, 1973) age, (Bell and Sturkie, 1965; Leonard, 1969) and nutritional states (Newberne, 1975). Haemoglobin plays a very important role in the pathology of birds similar to those of higher vertebrates.

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The present study is an attempt to study the alteration in haemoglobin values and total erythrocyte counts in pigeons under natural conditions of infectivity in blood due to *Haemoproteus* infection.

## II. MATERIALS AND METHODS

Pigeons (*Columba livia*) were used as experimental models for this study. The pigeons were collected from the wild condition and kept in cages in the laboratory. Blood samples for the preparation of blood smears were obtained from a wing vein. The air-dried blood smears were subsequently fixed in methanol for five minutes and stained with Giemsa's stain. The slides were examined microscopically at 100x and birds were classified as negative or positive for parasites. Parasites were identified by examination of smears, using previously published terminology (Peirce, 1981; Bennett and Peirce, 1988; Burrey-Caines and Bennett, 1992; Bennett *et al.*, 1994). The infection was confirmed and birds were divided into two groups: Group A (negative control) and Group B (infected) comprising of 20 birds each. Hb% and TEC were estimated according to Wintrobe (1981).

## III. RESULTS

After a careful investigation of parasitized birds which were infected with *Haemoproteus*, their blood parameters were studied and compared with their normal values (Hb% and TEC). Table 1 indicates that a significant fall was observed in the Hb% in the birds belonging to Group B. The control value of Hb% (13.410.17) declined to 10.8±0.37 in Group B, indicating a degradation of 18.97%. The TEC showed a significant fall in Group B. In control Group A, TEC was 2.19 0.02 which declined to 1.66±0.05 in Group B, indicating a 24.2% fall.

## IV. DISCUSSION

Heavily parasitized nestlings showed a significant (28%) reduction in Hb% but not in haematocrit values (Brien *et al.*, 2001) and infected individuals showed a higher Total Leukocyte Count than non-infected individuals. (Figuerola *et al.*, 1999). Infected nestlings appeared to have an elevated level of heterophils in their peripheral circulating blood and also showed signs of severe anaemia. (Stuht *et al.*, 1999). Erythrocyte number of infected chicks decreased significantly due to *E. tenella* infections (Fang Du-Ali and Du-AF, 2002) affecting the health status of their hosts. Infected individuals have also been reported to have elevated lymphocyte concentrations and plasma gammaglobulin levels (Ots and Horak, 1998).



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Above studies indicate that haematological indices viz. Hb% and TEC can be used as viable indicators of avian haematozoan infection. These values have shown an appreciable decline in Columba livia infected with Haemoproteus. Apparently, this parasite being an intracellular erythrocytic inhabitant utilizes the resources provided by the RBC and thus these cells undergo a marked decline in their number not only showing a fall in the number of red blood cells but also subsequently declining the hemoglobin values consequential to it. The factors responsible for this decline may be a direct destruction of the RBC's due to the parasite, a decrease in erthropoiesis or a release of some metabolites by the parasite there by destroying the host cell.

**Table 1: Haematological values in Columba livia due to Haemoproteus infection**

Haematological Parameters	Group A (Control)	Group B (Infected)	Percent % Fall
Haemoglobin (gm/100ml)	13.4 ± 0.17 (20)	10.8 ± 0.37 (20)	18.97%
Total Erythrocytes Count (10 <sup>6</sup> /Cmm)	2.19 ± 0.02 (20)	1.66 ± 0.05 (20)	24.20%

The values of given are mean ± S.E. and number of pigeons used (n) is given in parentheses.

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