

## Infection of Protozoan Parasites Found in Birds in Various regions of District Anantnag with special reference to *Haemoproteus columbae*

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### ABSTRACT

A total blood films of 150 birds were made from different spots of belonging to Falconiformes, Galliformes, columbiformes, Psithaciformes, Piciformes and Passeriformes were examined. *Haemoproteus columbae* was found in pigeons (12.2%) sparrows (1%) and Myna (12.50%). *Haemoproteus columbae* is the major protozoan infection reported in pigeon and appeared in the erythrocyte of the peripheral circulation. Incidence and parasitaemia of *H. columbae* in pigeon was studied in different localities of District Anantnag, using thin blood smear examination. Of the 150 pigeons (wild: 60, domestic: 90), 45 (30%) were found to be infected with *H. columbae*. Mature and immature gametocyte encircled the erythrocyte nucleus to form a halter shaped appearance were characteristic feature of the parasite. *Pseudolynchiacanariensis*, the vector for *H. columbae* was also recovered from beneath the feathers of pigeons.

**Keywords:** *Haemoproteus columbae*, District Anantnag, South Kashmir, Pigeon.

### INTRODUCTION

Pigeon occurs worldwide, and considered as a symbol of peace, love, gentleness and spirit messengers and now-a-days also for meat, ornamental pet bird. Pigeon suffers from many metazoan and protozoan infections among which *Haemoproteus columbae*, transmitted by *Pseudolynchiacanariensis*, affects domestic as well as wild pigeon. These infections were long considered to be non-pathogenic (Ashford [1971](#); Benett et al. [1988](#)), although now they are known to negatively impact the reproductive success of wild birds (Allander [1997](#); Merino et al. [2000](#)). The disease caused by *H. columbae* in pigeon is called as pseudomalaria or pigeon malaria and is fatal to young pigeons. In pigeon, gametocytes occur in erythrocytes and possess a halter or crescent shaped or horse shoe shaped partially encircling the nucleus of the host cell (Soulsby [1982](#)). There are a very limited number of studies on *H. columbae* in pigeon from India (Mandal [2002](#); Shinde et al. [2008](#)). The present

study was directed towards the investigating the incidence of *H. columbae* in pigeon reared in purely domesticated and in free ranging in Anantnag district of Jammu and Kashmir state of India.

## MATERIALS AND METHODS

A total of 150 blood smears of different species of birds were collected from different areas of Anantnag in the month of May and July 2018.

Birds were captured by nets; the blood smears were made by pricking and taking a drop of blood from brachial vein of avian hosts.

The blood smears were made on the clean sterilized slides. Slides were cleaned with 70% alcohol. Mostly these blood films were made which after fixing with methyl alcohol were stained with Giemsa stain at a concentration of 2 drops of stain in one cc of buffered distilled water (pH 7.2). Stained blood smears were examined under oil immersion (x100).

## STUDY AREA

The present study was carried out in Anantnag (33.73°N 75.15°E), a semi-urban area located in the North-western part of India at 1600m above sea level. The study region has a subtropical climate, with an annual rainfall of about 2853 mm. The mean annual minimum and maximum temperature is 6.59°C and 17.06°C, respectively.

## COLLECTION OF BLOOD SAMPLES

A total of 150 pigeons (90 domestic and 60 wild) were caught using net from May 2018 to July 2018 from different localities of Anantnag. After catching, birds were inked and blood samples were collected by vein-puncture method from wing vein in vials containing EDTA. Thin blood smears were prepared from collected samples; air dried, fixed with methanol and were stained with 5 % Giemsa stain and examined under oil immersion. Blood smears were differentially counted for *H. columbae* and level of parasitaemia was reported as number of parasites per 1,000 erythrocytes and each smear was counted until at least 10,000 uninfected red blood cells were seen before they were declared negative. The birds were also examined for the presence/absence of ectoparasites. PCR tests for *Haemoproteus* have been developed. Little is known about effective treatment. No drug is approved for commercial use. Antimalarial drugs reduce the parasitemia but do not eliminate the parasite. Chloroquine, primaquine, quinacrine, and buparvaquone have been used in pigeons.

## RESULTS

Of the 150 birds, 45 (30 %) were found to be infected with *H. columbae* and 5 (3.33 %) birds were found to be infected with *Pseudolynchiacanariensis*, which is vector for this parasite. On stained blood smears gametocytes were detected in the cytoplasm of the erythrocytes (Fig. 1). The gametocyte encircled the erythrocyte nucleus and formed a halter shaped appearance. Incidences of *H. columbae* in wild and domesticated pigeons were recorded 41.67 % (25/60) and 22.22% (20/90), respectively. The infected erythrocytes were counted in microscopic field for a total of ~1,000 numbers of erythrocytes in all cases. Of the 45 positive blood smears, 25 (55.55%) showed 1–2 infected erythrocytes, 15 (33.33 %) on 3–5 erythrocytes and 05 (11.11 %) more than 5 erythrocytes with gametocytes of *H. columbae*. The infected erythrocyte contained only single gametocytes on examination of all positive cases. While examining the body of the pigeons, 11 numbers of hippoboscids flies were caught from 9 infected birds and later they were identified as *P. canariensis* (Fig. 2).

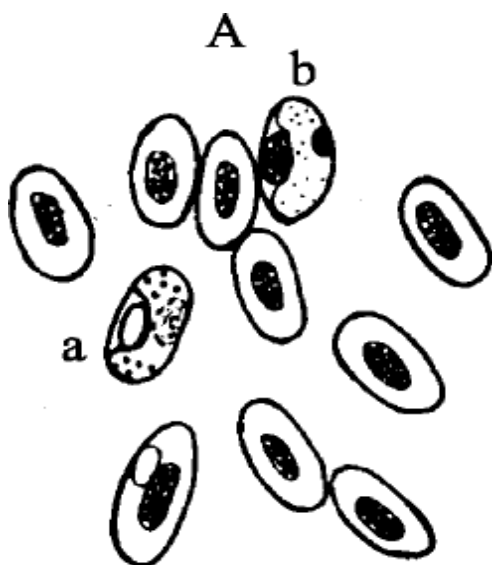


FIG 1: *Haemoproteus columbae*

A: Gametocytes in pigeons  
 Body (a and b)



FIG 2: *Pseudolynchiacanariensis*

We have used Chi-square statistic for testing if *H. columbae* infection depends on the type of pigeon (wild type or domestic type) or not by choosing level of significance at 5%.

**Table 1: Incidence of *Haemoproteus columbae* in wild and domestic Pigeons**

PIGEON TYPE	Parasitism by <i>haemoproteus columbae</i>		TOTAL
	INFECTED	NONINFECTED	
WILD	25	35	60
DOMESTIC	20	70	90
TOTAL	45	105	150

**Table 2: Computation of Chi-square statistic and P value**

S. NO.	OBSERVED FREQUENCY OF INFECTIONS (O)	EXPECTED FREQUENCY OF INFECTIONS (E)	$(O-E)^2/E$
1	25	18	2.722222
2	20	27	1.814815
3	35	42	1.166667
4	70	63	0.777778
CHISQUARE VALUE			6.481481
DEGREES OF FREEDOM			1
P VALUE			0.0109

From table 2 it is clear that P-Value is 0.0109 which is less than 0.05 (level of significance) which shows that *H. columbae* infection depends on the type of pigeon (wild type or domestic type).

## DISCUSSION

A number of ectoparasites and endoparasites occurring naturally in the pigeons were recorded by collecting the samples from different regions of District Anantnag. Although the parasitic load in the wild is likely to be more than domesticated, it is speculated that the severe infestation in some birds may be due to their dense

and confined rearing and also attributable to their poor and unorganized management.

Different stages of the haemoprotozoa *H. columbae* were observed in the blood of live birds observed from the screened area. The *Haemoproteus* gametocytes partially encircle the erythrocyte nucleus forming a halter-shape and often occupy over one half of the erythrocyte cytoplasm causing slight enlargement of the infected host cells and displacement of the red blood cell nucleus to one side [4]. The higher prevalence of parasitaemia observed in male birds is in contrast to the findings of Earle and Little [6]. Al-Barwari and Saeed [1] proposed a number of endogenous and exogenous factors that could have an accumulative influence on the parasitisation of both sexes of the pigeons by these parasites, such as host's hormones and humoral compounds, age and nutritional state, behaviour and habits, as well as the season of the year and ecological and physical features of the regions. A significant variation ( $p < 0.05$ ) was observed which shows that *H. columbae* infection depends on the type of pigeon (wild type or domestic type) in pigeons. This variation in blood profile could be attributed to high parasitic load that contribute to the development of anaemia. This has been indicated by the significant fall in haemoglobin values.

Similar differences in blood parameters between infected and non-infected birds have been reported in the literature [08–10]. The pigeon flat fly *P. canariensis* feeds on blood and contributes in spreading the obligate blood parasites *Haemoproteus* sp. [11, 12] and their recovery in the present study establishes the mode of transmission of the haemoprotozoan agents. It has also been previously observed in pigeons from this region [2]. Furthermore, a number of lice and mite species are believed to have evolved an association with this particular species of hippoboscids [7]. The role of these ectoparasites cannot be ruled out in haemoprotozoan transmission. The data generated may be helpful in estimating the prevalence of different parasites and also help in the strategic management of parasitic load during various seasons.

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