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Prevalence of ectoparasitic infestation of pigeon (*Columba livia domestica*) in Assam, India

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Abstract

A prevalence study was carried out to assess the ectoparasitic infestation of pigeon in Assam for which 324 pigeons were examined during January 2015 to February 2016. Of the total, 129 birds were found positive, the overall percentage of infestation being 39.78%. Seven species of ectoparasites were identified and species wise, percentage of prevalence were *Columbicola columbae* (12.03%), *Menopon gallinae* (4.62%), *Lipeurus caponis* (2.16%), *Goniocotes gallinae* (1.85%), *Menacanthus stramineus* (2.77%), *Goniodes gigas* (1.23%) and *Pseudolynchia canariensis* (15.12%). It was seen that the pigeons infested with *Pseudolynchia canariensis* had highest rate of infestation (15.12%) followed by *Columbicola columbae* (12.03%) and lowest record observed in case of *Goniodes gigas* (1.23%).

Keywords: Ectoparasite, lice, fly, prevalence, pigeon, Assam

1. Introduction

Pigeons of the order Columbiformes are one of the first animals that man domesticated and over thousands of years used for a multitude purposes like message carrying, sports (racing), aviary specimens, laboratory animals, cultural and as religious symbols [13]. Pigeon rearing is very popular among the rural masses of Assam either for meat purpose or being aviary lovers. Moreover, it requires only a little initial investment for construction of their night shelter as well as for their feed as they mostly scavenge their feed. Hence, pigeon rearing can be considered as backyard poultry farming by the rural people without any investment for providing financial support as well as readily available meat to the household. There is an acute and growing shortage of animal protein, in the majority of developing countries where it is about 11 g average daily per capita consumption as compared to 49 g intake in developed countries. [6] Poultry industry is the most effective and economical source of animal protein in shortest possible time. Poultry producers are looking for some substitute of chicken meat, which in the future will come in the form of pigeon and quail meat to contribute towards the increase in gross domestic product (GDP) through livestock sector. [2] In spite of great potentialities for supplementary income, the growth of pigeon farming is hindered by different diseases and heavy mortality, there on. However, they also suffer from various parasitic infection, both endo and ectoparasites. The effects of parasitism on birds are often severe, including retarded growth, low egg production and susceptibility to other infections [4].

No previous studies have been carried out on ectoparasites of domestic pigeons in Assam except report of endoparasitic infection [12] and hence this study provides baseline or preliminary information on the subject. Therefore, the present study was conducted to record the species of ectoparasites and their prevalence in pigeons in four districts of Assam, namely Kamrup Metro, Kamrup Rural, Lakhimpur and Dhemaji.

2. Materials and Methods

A total of 324 live pigeons irrespective of age (nestling and adult), sex (male and female) and place of collection (temple premises, market places, household etc) were thoroughly examined during January 2015 to February 2016 for the presence of ectoparasites on their body surfaces. The ectoparasite, pigeon fly was collected by holding a glass tube over it and allowing the fly to settle on to the tube. Lice, when present were collected using a fine forceps by separating the feathers of various parts of the body of pigeons. The fly and lice were kept in glass vials containing hot water to kill them with their legs extended. The killed lice were preserved separately in vials containing 70% alcohol mixed with few drops of 5% glycerine and properly labeled for further morphological identification. The types of louse collected along with their location on the body of pigeon were recorded.

2.1 Identification

The different specimens of preserved lice were processed in 2% potassium hydroxide by gentle boiling. This was followed by repeated washings in tap water. Thereafter, dehydration was done in ascending grades of alcohol viz. 50%, 70%, 80%, 90% and 2 changes of absolute alcohol, each step consisting of 15 minutes and then clearing in xylene. Permanent mounts of the specimens were prepared using DPX as per the method described by Cable [3]. The mounted specimens were subjected to morphological identification as per the keys and descriptions given by Sen and Fletcher [14] and Soulsby [15] under a stereoscopic binocular microscope and a compound microscope.

Chi-square test was used for statistical analysis of the prevalence data by using SAS v.20 software.

3. Results and Discussions

Out of 324 pigeons examined for ectoparasitic infestation, 6 species of lice and 1 fly species were identified (Table 1, Fig 1) viz. *Columbicola columbae* (12.03%), *Menopon gallinae* (4.62%), *Lipeurus caponis* (2.16%), *Goniocotes gallinae* (1.85%), *Menacanthus stramineus* (2.77%), *Goniodes gigas* (1.23%) and *Pseudolynchia canariensis* (15.12%). The morphological details of recorded ectoparasite species along with the location on the body of pigeon is presented in Table-2. The overall percentage of ectoparasitic infestation recorded in pigeon in Assam was 39.78%. In contradiction to our findings, Adang *et al.* [1] examined 240 domestic pigeon in Zaria and recorded 73.8% prevalence, while Msoffe *et al.* [9] recorded 62% prevalence in pigeons in Tanzania. The results of our study are in line with previous findings (Dranzoa *et al.*, [4] from Uganda; Adang *et al.*, [1] from Zaria; Msoffe *et al.*, [9] from Tanzania, Musa *et al.*, [10] from Bangladesh) who also reported similar species of ectoparasites. Mushi *et al.* [11] in their study in Botswana reported two ectoparasite species,

with more prevalence of the pigeon fly, *Pseudolynchia canariensis* (50%) than *Columbicola columbae* (30%) which is in agreement with our present findings of highest prevalence of the former species (15.12%) followed by *C. columbae* (12.03%). Klei and Deguist [8] documented that 16% of pigeons examined were parasitized with *P. canariensis* which agrees to our present finding of 15.12%. However, in contrast to our report, Dranzoa *et al.* [4] and Foronda *et al.* [5] recorded 94.1% and 100% prevalence of *Columbicola columbae* in Uganda and Tneriffe respectively. The variation in prevalence of ectoparasites could partly be attributed to the weather prevailing in the study period, sample size, health status of the pigeons and living condition etc. Lice infestation causes ill health of birds due to blood sucking behavior, weight loss at the rate of about 711 gms per bird and decrease the egg yield at the rate of about 66 egg per bird/year and lameness is associated with heavy infestation (Khan) *et al.*, [7]. Statistical analysis by Chi square test revealed highly significant ($P < 0.01$) difference in prevalence of different species of ectoparasites.

Table 1: Prevalence of ectoparasitic infestation in pigeon

Ectoparasite Species	No. of pigeon positive	Infestation Percentage (%)	Chi-square value
<i>Pseudolynchia Canariensis</i>	49	15.12	<.0001**
<i>Columbicola columbae</i>	39	12.03	
<i>Menopon gallinae</i>	15	4.62	
<i>Lipeurus caponis</i>	7	2.16	
<i>Goniocotes gallinae</i>	6	1.85	
<i>Menacanthus stramineus</i>	9	2.77	
<i>Goniodes gigas</i>	4	1.23	
Total	129	39.78	

**Highly significant ($P < 0.01$)

Table 2: Morphological characteristics of ectoparasites recorded from pigeon

No.	Location	Morphological description	Interpretation
1	Wing feather	The most slender of the biting lice. It measured 2.00-2.2 mm in length. The louse has an elongated reddish brown head in front of the five segmented antennae with two pairs of dorsal spines. The first segment of the antennae is much enlarged. It was found on the long flight feathers of pigeons.	<i>Columbicola columbae</i>
2	Fluff	This louse has a broad, rounded and short head. It measured 1.2-2 mm in length and found at the base of the feathers of fowl. Spines in front of the insertion of the antennae in both sexes are lacking.	<i>Goniocotes gallinae</i>
3	Wing feather	Body is slender and elongated, measuring 2.5-3 mm in length. It was found in the wing feather of fowl. Antennae consist of five segments and it is filliform. Maxillary palps are absent.	<i>Lipeurus Caponis</i>
4	Skin/ thin feathered areas of body	Located on breast, thigh and around the cloaca. Its measurement is 2.5-3.5 mm long in male and 2.7-3.8 mm long in case of female. Antennae consist of five segments and lying in grooves on sides of the broad head. Third segment resembles the shape of an egg cup and holding the fourth segment.	<i>Menacanthus stramineus</i>
5	Shaft of feather	Its measurement is 1.5-2mm length in male and 1.71-2.5 mm length in case of female. Head is broad and the antennae lying in grooves on the sides of the head, maxillary palps consisting of three segments. Tarsi have paired claws.	<i>Menopon gallinae</i>
6	Body feather	It is measured 3-4 mm in length. Body is nearly black in colour. Head is broad. Antennae have five segmented and no maxillary palps.	<i>Goniodes gigas</i>
7	Body feather	The pigeon fly is a small, flat fly with a flattened head, short face and palpi which form a sheath for the proboscis. The eyes are round or oval. The sac like abdomen has chitinized basal segments. The short legs have short tarsal with strong claws. The wings are characterized by weak posterior veins, have five distinct veins behind the costa.	<i>Pseudolynchia canariensis</i>



a) *Menacanthus stramineus*



b) *Menopon gallinae*



c) *Lipeurus caponis*



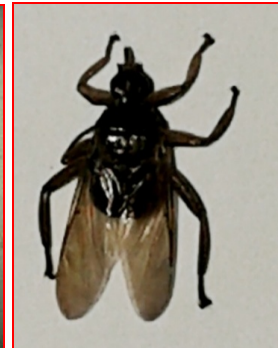
d) *Goniodes gigas*



e) *Columbicola columba*



f) *Goniocotes gallinae*



g) *Pseudolynchia canariensis*

4. Conclusion

In the present study, 6 species of lice and 1 fly species were identified viz. *Columbicola columbae* (12.03%), *Menopon gallinae* (4.62%), *Lipeurus caponis* (2.16%), *Goniocotes gallinae* (1.85%), *Menacanthus stramineus* (2.77%), *Goniodes gigas* (1.23%) and *Pseudolynchia canariensis* (15.12%). *Pseudolynchia canariensis* which acts as vector of *Haemoproteus columbae* was found having highest prevalence (15.12%). So the control of this vector is of utmost importance.

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