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SHORT COMMUNICATION

Prevalence of *Trichomonas gallinae* infection in Pigeon of Jessore District, Bangladesh

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ABSTRACT

Objective: This study was conducted to estimate the prevalence of *Trichomonas gallinae* infection in pigeon and determination of spatial factors related with *T. gallinae* infection among smallholder farms at Abhaynagar and Monirampur Upazillas, Jessore District, Bangladesh.
Materials and Methods: This cross-sectional study has undertaken from November 24, 2017 to February 28, 2018 on randomly selected 60 pigeons from 12 smallholder farms. Wet smear technique has been used to identify *T. gallinae*, from swab samples collected from oropharynx and crop of the sampled birds.
Results: The overall prevalence was 60% (95% CI: 46.5–72.4) in which 75% (95% CI: 55.1–89.3), 50% (95% CI: 23.0–76.9), and 44.4% (95% CI: 21.5–69.2) were in squab, adult male, and adult female, respectively. The prevalence, in the case of dead pigeons (n = 13), 69.2% showed positive to the protozoan infection in the study. On the basis of spatial distribution, *T. gallinae* infection in the rural area was 64% (n = 25) followed by urban area 57.1% (n = 35) of the district. The prevalence of T. gallinae was insignificantly higher at Abhaynagar upazilla in contrast to Monirampur upazilla (30%) of Jessore district.
Conclusion: This research finding suggests that a significant level of (57.4%) *T. gallinae* infection is circulating among the pigeon population of Bangladesh. Therefore, proper housing, feeding, and disease management should be ensured by the owner to prevent this problem.

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Trichomonas gallinae; pigeons; smallholdings; urban; rural.

Introduction

Pigeon farming is gaining popularity in Bangladesh. On the entire population of pigeons raised in our country, one would possibly guess, by assessing the amount of pigeons and squabs sold-out in virtually each live bird market, that pigeons contribute considerably to the poultry meat sector within the country [1]. Unfortunately, there is scantly revealed data on the population of pigeons and their common diseases in our country. There may be some printed data on the management sides and breeds of pigeons found in Bangladesh; however, epidemiologic studies relating to the prevalence of different diseases of pigeons within the context of parasitological aspect are incredibly vital to grasp the present state of affairs.

Several health issues will have an effect on pigeons; however, parasitic infections will play an important role. The role of pigeons in the transmission of disease to other pigeons, domestic animal, and poultry and especially to human has been well documented by many authors [2,3].

Among parasites, protozoa *Trichomonas gallinae* inhabiting the digestive tract of pigeons are responsible for considerable economic loss [3]. The infected pigeon shows signs of dullness, depression, and diarrhea, characterized by yellow pasty stools [4]. Mortality in naturally infected untreated cases may be high allowing very high morbidity rate that makes this problem more [3].

Among protozoa, *T. gallinae* causes Avian Trichomonasis and affects upper digestive and respiratory tract. Pigeons and doves of the family Columbidae are the most common hosts of the flagellate protozoan *T. gallinae,* with prevalence up to 100% [5]. The protozoan has been reported in a number of other avian orders worldwide [6,7] such as

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turkey, chicken, eagles, falcons, and bustards may also be infected [3] In fact, Avian Trichomonasis caused by *T. gallinae* is a disease of young [3] pigeons, which may result in a high mortality in young pigeons [3,8] within 10 days. A high latent infection rate (up to 90%) has also been reported in [9]. Experimental studies reveal marked difference in pathogenicity and virulence among different strains of *T. gallinae* [5]. Although the parasite is spread directly, via shared nourishing or from parent to huddling (crop milk) but indirectly via water or food [10] is also possible. Signs of trichomonasis include yellowish caseous lesions and or necrotic ulcerations in the upper digestive and respiratory tracts, a foul cheesy smell originating from the gaze, and sniffing of parts of the head such as the eyes or nose [7].

Trichomonas gallinae is an important one infecting pigeons concerning morbidity and mortality rate as well as economic loss in most countries of the world [3,5]. In Bangladesh, the same scenario is also suspected in pigeon but no such type of significant study has been done yet.

If the common diseases of pigeons are controlled, their production may be well enhanced. For management and interference of Pigeon's illness, the primary scientific approach ought to be the entity of the disease and pathologies related to them. Therefore, this study has conducted to estimate the prevalence of *T. gallinae* infection in pigeons and to determine the spatial factors related with *T. gallinae* infection in pigeons.

Materials and Methods

Study site

Cross-sectional study for a period of 4 months starting from November 24, 2017 to February 28, 2018 in Abhaynagar and Monirumpur Upazillas under Jessore District has been conducted. The study location has been visualized in the map (Fig. 1).

Sampling strategy

Twelve smallholder farms from 20 (having at least 15 pigeons) were randomly recruited for this study in which ten farms were located in Abhaynagar upazilla (seven in urban area & three in rural area) and other two located at Monirumpur Upazilla (rural area). Randomly selected five pigeons (minimum with two squabs, one adult male and one adult female) from each farm were evaluated for *T. gallinae* infection from each farm. Again, the number of birds died during the study period in the sampled farms was also evaluated for this study. According to this, the total sampled pigeons were 60.

The study treated a squab up to 6 weeks of age and an adult from 1.5 months to above. The baseline information including farm size and disease history for the pigeons

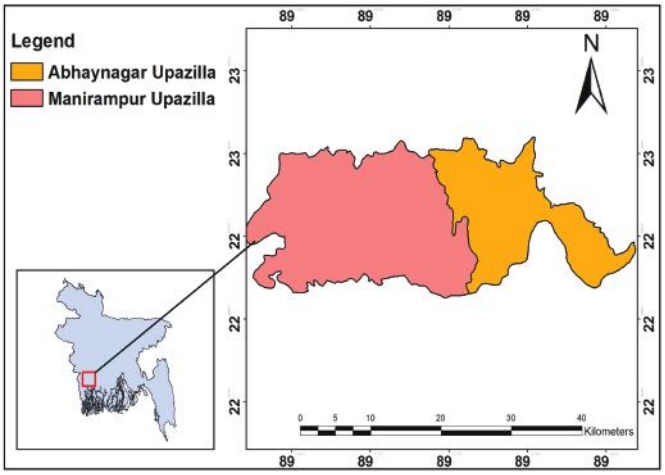

Figure 1. Map locating the study site.

of the study farms were collected through pretested Questionnaire.

Sample collection from live bird

Swab samples from oropharynx and crop were collected following the sample collection procedure described in [2]. Briefly, a sterile cotton swab was bungled up and absorbed into refined water. After the removal of the spare liquid, the swab was inserted in a swirling motion into the oropharynx as well as the crop of each bird. After that, fluid hold in the cotton of swab sticks was pressed on the slide. The slides were identified using a unique identification number maintaining a serial of the sampled farm. Separate swab sticks followed by separate slide were used for oropharyngeal and crop swab samples collected from each bird. After slide preparation, the sample containing slides were transported to the subsequent Upazilla Veterinary Hospital using a cool box for laboratory evaluation.

Sample evaluation

The swab samples were tested by wet mount technique and examined under light microscope for the organism *T. gallinae* maintaining standard procedure described in [2,11]. *Trichomonas gallinae* were identified under the field of light microscope at 400× magnification as motile, flagellated protozoa [11].

Evaluation of dead bird

Postmortem was performed for dead pigeons as described in [12]**.** In brief, the general body condition of the dead bird was examined and observed whether any exudation from the natural opening was present or not. Then, the bird was placed on its right aspect with the head pointed toward the examiner. The head was opened and also the blunt, a part

of the scissors, was inserted into oral fissure to chop and open. This method was continuing down the neck to open the esophagus and crop, oral cavity, and pharynx for the identification of the inflammation caused by *T. gallinae*.

Again, the swabs samples were collected from oropharynx and crops, and the microscopic slide was produced. The slide was evaluated under light microscope for the identification of *T. gallinae* considering their characteristics including elongated ellipsoid shape, presence of an obvious undulating membrane associated with four free anterior flagella and showed rolling jerky movement.

Statistical analysis

Obtained data were recorded into Microsoft Excel spreadsheet. The data were cleaned and forwarded to STATA 13.2 for descriptive statistics.

Results and Discussion

The overall prevalence of *T. gallinae* was 57.4% in which 70% among squabs followed by 50% among male pigeons and 46.7% among female pigeons. This findings notify that squabs are mostly susceptible, which may be due to the chance of being infected from their parents through shared feed and water where those are naturally occurred [11,13] (Table 1).

Among dead pigeons (N = 13), the prevalence of *T. gallinae* was 69.2% in which 87.5% of squabs similarly 50% and 33.3% of adult male and female, respectively. These findings are in line with [7,14] who revealed that *T. gallinae* infection as being a primary reason of death in squab similarly [3,7,13] reported that *T. gallinae* can cause up to 90% loss among young pigeons. This study identified the prevalence among adult bird is a bit lower than the study conducted in [5] and [13] but a bit higher than the study conducted in [7]. Again, some other studies conducted in [3] and [4] reported 90% prevalence of *T. gallinae* among dead young pigeons. These studies suggested that a substantial amount of infection is persisting among the pigeon population, which may cause death at a high rate among both juvenile and young adults (Table 2).

The overall prevalence (N = 60) of *T. gallinae* infection was 60% (95% CI: 46.5–72.4) in which squab, adult male, and adult female level prevalence were 75% (95% CI: 55.1–89.3), 50% (95% CI: 23.0–76.9), and 44.4% (95% CI: 21.5–69.2), respectively.

There was no significant difference in the occurrence of *T. gallinae* between live and dead squab, which is in line with the study conducted in [15]. Again, there was no any significant association of *T. gallinae* infection between live and dead male as well as live and dead female. These similar findings have been reported by many study conducted in [16] female in this observation. [7,13,17] found that an overall scenario of 60% pigeons was positive to *T. gallinae* infection. [7,11,13] observed that the prevalence of *T. gallinae* in adult pigeons was 76% [3] and found no significance difference in the prevalence of *T. gallinae* between male (77.7%) and female (79.5%). Similarly, [2,7,11,13] also did not find any substantial variance in the prevalence of *T. gallinae* between male and female (Table 3).The overall prevalence of *T. gallinae* in rural area (64%) was insignificantly higher than the estimated prevalence 57.1% in urban area of Jessore district. These findings are different than the study conducted in [5] who revealed higher prevalence of *T. gallinae* in urban pigeons rather than rural area pigeons. This dissimilarity may be due to the difference in small sample size and atmosphere of the study areas. Again, the prevalence of *T. gallinae* was inconsequentially higher at Abhaynagar upazilla in contrast to

Table 1. Frequency of *T. gallinae* in live pigeons of the study.

Type of Pigeon	Frequency	Percentage	95% CI
Squabs (n = 20)	14	70	45.7–88.1
Adult male (n = 12)	6	50	21.1–78.9
Adult female (n = 15)	7	46.7	21.3–73.4
Total (N = 47)	27	57.4	42.2–71.7

Table 2. Frequency of *T. gallinae* in dead pigeons.

Type of Pigeon	Frequency	Percentage	95% CI
Squabs (n = 8)	7	87.5	47.3–99.7
Adult male (n = 2)	1	50	1.3–98.7
Adult female (n = 3)	1	33.3	0.08–90.6
Total (N = 13)	9	69.2	38.6–90.9

Table 3. Univariate association between live and dead pigeon according to different age group and spatial factors.

Type	Category (n)	Positive (%)	Negative	p-value
Squab (n = 28)	Live (20)	14 (70)	6	0.6
	Dead (8)	7 (87.5)	1	
Adult male	Live (12)	6 (50)	6	1.0
	Dead (2)	1 (50)	1	
Adult female	Live (15)	7 (46.7)	8	1.0
	Dead (3)	1 (33.3)	2	
Sex	Male (14)	7 (50)	7	1.0
	Female (18)	8 (44.4)	10	
Industrialization	Urban (35)	20 (57.1)	15	0.8
	Rural (25)	16 (64)	9	
Administrative division	Abhaynagar (50)	33 (66)	17	0.07
	Monirampur (10)	3 (30)	7	

Monirampur upazilla (30%) of Jessore district. The study has been conducted for a very limited period with small sample size. Therefore, further study with a well-structured sample size is recommended.

Conclusion

The study revealed that Trichomonasis is a major threat to pigeons. Squabs were found more susceptible to the infection than adults. The cause of the death of most squabs might be due to *T. gallinae* infection. The comparative study in between urban and rural area expressed that the pigeons of rural areas were more susceptible to *T. gallinae* than the urban area.

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Conflict of interest

The authors declare that they have no conflict of interest.

Authors' contribution

SR, SS, and AKD collected the sample and perform the laboratory evaluation. SR drafted the manuscript. MAS analyzes the data and make interpretation of the result. SR, MAS, and MAH took part in preparing and critical checking of this manuscript.

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