Incidence and Hematological Study of Trichomoniasis in Domestic and Wild Pigeons in and Around Lahore, Pakistan

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Abstract: The present study was conducted to determine the incidence of Trichomoniasis and its effect on some blood parameters in pigeons. A total of 120 samples i.e. 60 fecal (Wild n=30, domestic n= 30) and 60 throat swab (Wild n=30, domestic n= 30) were collected during the month of July 2014 to September 2014 from Tollinton Market, Lahore Zoo and Safari park, Lahore. Out of 120 samples examined, 39 samples were found positive for T. gallinae. The incidence of T. gallinae was (32.5%). The highest rate of infestation by T. gallinae i.e. 42.5 % was recorded in the month of September 2014. While in July and August the infestation of this protozoa was 22 % and 32.5 % respectively. The overall infestation rate was 32.5 %. In infected pigeons, there was significant (P<0.05) decrease in hemoglobin concentration, number of monocytes and packed cell volume in diseased birds than healthy birds. Likewise, the values of total leukocyte count, lymphocytes and eosinophil were higher significantly (P<0.05) in infected pigeons than the healthy ones. While, no significant (P<0.05) difference was observed for heterophil count when infected and healthy birds were compared. This study reveals the incidence of Trichomoniasis in their birds especially in pigeons, consequently will help to overcome this disease thus helping them in increasing their income through pigeon farming.

Keywords: Incidence; Trichomoniasis; Pigeon, PCV, Lymphocytes; Eosinophil.

INTRODUCTION

It is very well known that internal parasites cause great loss to the host, by different ways. These parasites live at the expense of host depriving them from the nutrients essential for their growth. Moreover they cause mechanical harm by producing inflammation and tissue damaged. Protozoa inhabiting the digestive tract of birds are responsible for considerable economic losses. Heavy infestation of the parasites affect the health of birds with loss in the body weight, retarded growth, un thriftiness, damage to the gut epithelium, fertility disturbances, emaciation and death especially in young birds [1]. Common name of Trichomonas gallinae is canker, frounce and roup. Predilection site of this parasite is esophagus, crop and proventiculus. It belongs to the family Trichomondidae and class Zoomastigophorarsida [2].

This disease is present worldwide. A clonal strain of previously described organism has been recently developed as the cause of widespread disease of birds in Europe and causes a grate economic losses [3]. In Britain, this infectious disease was first described in 2005. This disease causes extraordinary significant mortality in birds which results in decreased population of green finches and passenines [4]. This disease causes large economic loss of avian livestock and also cause problems for wild species of birds. In UK T. gallinae has caused the death of greenfinches [5]. Trichomoniasis was first reported in 2005 in Britain. It was discovered in finches. It caused large scale mortality in finches with population decline [4, 6]. In 2007 this disease is reported in finches in the Canadian Maritime Provinces, southern Fennoscandia and northern Germany [6]. This disease caused high morbidity and mortality in finch population in Britain. It is estimated that about 1.5 million greenfinches which represent the 35% of national population have been died with this disease [6].
The host of T. gallinae is pigeon, turkey, chicken and raptors (hawks, falcons and eagle). As the method of reproduction is concerned it reproduced by longitudinal binary fission. There are no sexual stages and cyst are present in its life cycle. Lesion present in the turkey and chicken are most commonly in the area of crop, oesophagus, pharynx and no lesion are found in mouth [2].

Infected pigeons show wild signs of depression, lose weight, stand huddled with ruffled feathers and may fall over when forced to move. There is an accumulation of greenish fluid present in the mouth and crop containing large number of trichomonads in it. Yellow, necrotic lesions are present in the esophagus and crop [2]. Infection spread to the turkey and chicken by drinking contaminated water. The pigeon and other wild birds are also source of infection, which also use the water source. T. gallinae enters in the water through mouth and not from feces of the wild birds. Source of infection is direct contamination because this organism is very sensitive to drying and no cyst are found [2].

Prevalence of T.gallinae infection is different in different age of birds. Prevalence increased with the age of nestling [7]. A higher prevalence of Trichomoniasis has been recorded in pigeons in Pakistan season wise prevalence has been recorded to be 43%, being non significantly higher in April (56%) than in March (30%). Trichomoniasis positive cases show a significant decrease in hemoglobin concentration, number of monocyte, packed cell volume, body weight than healthy birds [8]. Looking at the endangered population status of wild and domestic pigeons, the present study was designed to find the incidence of Trichomoniasis in wild and domestic pigeons and to investigate the effects of Trichomoniasis on various blood parameters.

MATERIALS AND METHODS

The present study was designed to study the incidence of trichomoniasis in wild and domestic pigeons and its effect on blood parameters. To study the incidence of T.gallinae, a total of 120 samples i.e. 60 fecal (Wild n=30, domestic n= 30) and 60 throat swab (Wild n=30, domestic n= 30) were collected from Tollinton Market, Lahore Zoo and Safari park, Lahore. The fecal sample and throat swabs were examined first directly and then by stained smear [9].

Samples collection

The fecal samples were collected directly from cloaca region of the birds by using an aseptic culture swabs in separate culture tube after dipping it in normal saline and then were examined immediately, in the Medicine Laboratory, University of veterinary and animal sciences, Lahore. Throat swabs sample were collected individually from the pigeons through a swabs and then kept in culture tubes, after dipping it in normal saline to avoid desiccation and were examined immediately.

Sample processing

Fecal samples were examined under microscopic after making smears on glass slide directly. Rub swab on slide after putting a drop of normal saline on it then cover it with cover glass and examined it under low microscope.

Direct Smear Method

In this method, a drop of normal saline was placed on the clean glass slide and the swab which had material stick on it was rub on the slide and thus made a smear on slide and see it under microscope.

Preparation of Wright Giemsa Staining

30 mg of dry wright’s stain powder and 30 mg of Giemsa stain powder will be ground in marter with 100ml of absolute methyl alcohol (acetone free). The mixture was allowed to stand for 24 hours before use [10].

Staining of slides

For staining of slides Wright Giemsa stain was used [9]. First made smear on clean glass slide then dry it. Then poured a drop of stain on slide and wait for 1-3 minutes. After it added equal amount buffered distilled water or neutral water (PH 6.6 to 6.8). Allowed mixture to stand for 3-5 minutes then poured it and washed with water thoroughly. Then dried it and examined under microscope.

Hematological studies

Blood samples were collected from both group i.e. infected and healthy pigeon. 5ml disposable syringe was used to collect blood from wing vein of pigeons. One ml of blood was taken from each bird’s wing vein, after adding 1% EDTA. Blood samples were examined for total leukocyte count, differential leukocytes count, hemoglobin estimation and packed cell volume.

RESULTS

The present study was conducted to investigate the incidence of Trichomonas gallinae in domestic and wild pigeons. To determine the effect of T. gallinae infection on different blood parameter i.e. Hemoglobin estimation, TLC, DLC, PCV % age, Heterophils, Monocytes, Lymphocytes, and Eosinophil. Fecal samples were examined under microscopic after making smears on glass slide directly. Rub swab on slide after putting a drop of normal saline on it then cover it with cover glass and examined it under low microscope (Figure 1).
Incidence

To study the incidence of *T. gallinae*, a total of 120 samples i.e. 60 fecal (Wild n=30, domestic n= 30) and 60 throat swab (Wild n=30, domestic n= 30) were collected during July 2014 to September 2014 from Tollinton Market, Lahore Zoo and Safari park, Lahore. Out of 120 samples examined (39) were found positive for *T. gallinae*. The incidence of *T.gallinace* was (32.5%). The highest rate of infestation by *T. gallinae* i.e. 42.5 % was recorded in the month of September 2014. While in July and August the infestation of this protozoa was 22 % and 32.5 % respectively. The overall infestation rate was 32.5 % (Table 1).

<table>
<thead>
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<th>Month</th>
<th>Total no. of samples examined</th>
<th>Total no. of positive samples</th>
<th>Infestation</th>
</tr>
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</tr>
<tr>
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<tr>
<td>September</td>
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<td>17</td>
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<td>Total</td>
<td>120</td>
<td>39</td>
<td>32.5</td>
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</table>

Hematology

For this purpose 15 healthy and 15 infected pigeons were randomly selected and their blood was examined for the following parameters.

Hemoglobin Estimations

The value of hemoglobin of 15 healthy birds was 9.0, 8.5, 11.0, 12.0, 10.0, 11.0, 11.5, 8.0, 9.5, 9.0, 10.0, 11.0, 8.0, 12.0 and 9.5 while the value of hemoglobin of 15 infected birds was recorded as 7.5, 7.0, 7.5, 6.5, 6.0, 5.0, 6.5, 7.0, 6.5, 6.0, 5.0, 7.0, 6.5, 6.0 and 7.0, respectively (Table 2).

Leukocyte count (TLC)

The total leukocyte count of 15 healthy pigeons were as 24000, 28000, 29000, 26000, 26000, 28500, 29500, 27500, 27500, 27000,25000, 28500, 27500, 26000 and 27500 while the TLC of 15 infected pigeons were as 29000, 31500, 31500, 32500, 32500, 32000, 30000, 29000, 33000, 31000, 32000, 29000, 30000, 33000 and 30000, respectively (Table 2). This result shows that infected birds have higher number of leukocytes.

Heterophils count

The heterophils count of 15 healthy pigeons were 4500, 4500, 4500, 4550, 4650, 4750, 4700, 4700, 4850, 4700, 4550, 4500, 4600 and 4700. While the heterophils count of 15 infected pigeons were 5500, 4800, 5000,4800, 4500, 4000, 4800, 5400,5000, 5500, 4800, 5000, 4800, 5400 and 5000 (Table 3).

Monocytes

The monocytes of healthy pigeons were 1500, 1550, 1450, 1400, 1500, 1400, 1500, 1550, 1400, 1450, 1500, 1500, 1450, 1400 and 1500 while the monocytes of infected birds were 1300, 1250, 1400, 1400, 1250, 1150, 1300, 1400, 1350, 1300, 1400, 1350, 1400, 1200 and 1300. These results show that the infected birds had little bit lower monocytes than the healthy ones Table 3.)
The number of eosinophil of healthy pigeons were 450, 430, 470, 300, 430, 420, 470, 450, 430, 450, 400, 450, 400, 420 and 450, while the unhealthy birds had the number of eosinophil were 650, 680, 600, 780, 700, 650, 750, 700, 600, 550, 620, 500, 700, 400 and 650. These results shows that the infected birds have slight increase in the number of eosinophil than the healthy ones.

Lymphocytes
The lymphocytes of healthy pigeons were 16000, 15500, 14500, 16000, 15500, 15000, 16500, 16000, 15500, 15000, 15500, 16500, 16000, 17000 and 16500 while the lymphocytes of infected birds were 19000, 19500, 17500, 19000, 18500, 17500, 18000, 18000, 17500, 18500, 18500, 18000, 18500, 18000 and 19500. These results show that the infected birds have higher value of lymphocyte than the healthy ones.

Table-2: Blood Parameters of Healthy Birds tested in this study

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<tr>
<th>Sr#</th>
<th>Hb (g/dl)</th>
<th>TLC (103/μl)</th>
<th>Heterophils (103/μl)</th>
<th>Monocytes (103/μl)</th>
<th>Lymphocytes (103/μl)</th>
<th>Eosinophil (103/μl)</th>
<th>PCV (%)</th>
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Table-3: Blood Parameters of Infected Birds tested in this study

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<tr>
<th>Sr#</th>
<th>Hb (g/dl)</th>
<th>TLC (103/μl)</th>
<th>Heterophils (103/μl)</th>
<th>Monocytes (103/μl)</th>
<th>Lymphocytes (103/μl)</th>
<th>Eosinophil (103/μl)</th>
<th>PCV (%)</th>
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Packed Cell Volume (PCV %)
The Packed cell volume percentage (PCV %) in healthy birds range from 26 to 32, while the range in infected birds was 18 to 26, which is below than healthy ones.

DISCUSSION
The present study was conducted to investigate the incidence of Trichomonas gallinae in domestic and wild pigeons. To determine the effect of T. gallinae infection on different blood parameter i.e. Hemoglobin estimation, TLC, DLC, PCV %age, Heterophils, Monocytes, Lymphocytes, and Eosinophil.

Incidence
To study the incidence of T. gallinae, a total of 120 samples i.e. 60 fecal (Wild n=30, domestic n= 30) and 60 throat swab (Wild n=30, domestic n= 30) were collected during July 2014 to September 2014 from Tollinton Market, Lahore Zoo and Safari park, Lahore.

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The incidence of total leukocyte count (TLC), culture positive for protozoa. Total 100 blood samples were collected during the months of March and April 2005. Higher prevalence (P<0.05) was recorded in wild pigeons (60%) than in domestic pigeon (26%). The overall prevalence recorded was 43%, being non significantly higher in April (56%) than in March (30%) [8]. These results were also correlate with the study that was done in Bangladesh. Adult pigeons having age more than 3 months were comparatively more affected (75%) than the squab having age less than 30 days (72.1%) and the younger aged between 30 days to 90 days (64.7%). Significance (P<0.01) of T. gallinae infection were low in summer (48.4%) than rainy (69.8%) and winter (69.3%) seasons [11].

The overall positive percentage of T. gallinae of 32.5% correlate with other study that was done in Spain, in which 91 hunter-harvested Common Wood Pigeons Columba palumbus from northern (n = 30) and southern (n = 61) Spain during the winter period. He examined the pigeons by using three different methods i.e. direct inspection for the presence of lesions, direct microscopic observation and culture. The positive percentage for the presence of T. gallinae was 34.2%. This prevalence was significantly higher in adult Wood Pigeons than in the juvenile group, and prevalence was significantly lower in birds sampled from the north [12]. The highest rate of infestation by T. gallinae i.e. 42.5% was recorded in the month of September 2014. These results correlate with another study that was done on UK. This study indicate that T. gallinae is a major threat to an endangered endemic, the pink pigeon. They examined that the population of columbids act as a reservoirs of Trichomonas gallinae. 296 birds were examined. Prevalence of T. gallinae was 44.3% [13].

These results are in accordance with the study that was conducted on the prevalence and pathological lesion of Trichomonas gallinae in pigeons in the northeast part of Iran. Total 418 Samples were collected from oral cavity of pigeons and were examined by using Giemsa’s stain between April 2005 and June 2009. Prevalence of T. gallinae was 37.32% [14].

Hematology

In the present study 15 blood samples from naturally infected pigeons were examined for hematological studies to know the changes in blood picture due to T. gallinae and also see the 15 blood samples of healthy pigeons which were already declared -ve carrier of T. gallinae after laboratory confirmation to see the clear difference between both groups.

Hemoglobin Estimation

The results of present study show that the values of hemoglobin estimation in infected birds are lesser than that of healthy birds. It may be due to these protozoa. Statistical analysis showed that there is significant difference (P<0.05) between the healthy and infected birds. The present observations correlates with the study conducted on the prevalence of trichomoniasis and its effect on some blood parameter and weight gain. In that study two groups were made, each group were consisted of ten birds. Group ‘A’ were nominated of a healthy birds that was declared -ve. Group ‘B’ were nominated of a healthy birds that was positive for T. gallinae after laboratory examination. Two ml blood was taken from wing veins of each bird from both group ‘A’ and group ‘B’. Some blood parameters like hemoglobin (Hb) concentration, total leucocyte count (TLC), heterophilis, monocytes, lymphocytes, eosinophils and packed cell volume (PCV) were measured by using typical procedures, which was defined in studied [17]. Affected pigeons were anemic due to lessened Hb concentration and there was a significant (P< 0.05) decrease in Hb concentration and packed cell volume in diseased pigeons [8].
CONCLUSION
There is a significant (P<0.05) difference between the means of Hb, PCV, TLC, Monocytes, Lymphocytes and Eosinophils. While there is no significant (P≥0.05) difference between the means of heterophils. It is anticipated that outcome of this work will provide the veterinarian and pigeon farmers a guide line about the common occurrence of Trichomoniasis and will help them to overcome this disease thus helping them in increasing their income through pigeon farming.

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Conflict of Interest
Authors declare that there is no conflict of interest.

REFERENCES

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