Pathological Study on Parasitism in Racing Pigeons; An Indication of Its Effects on Community Health

Ali Mohammad Bahrami, Alizaman Doosti, Hossein Nahrevanian, Morteza shamsi

Objective: Several non-official reports from different clinics, governmental veterinary head-quarters and bird keeper indicated that most of the young pigeon die with suspicious of infection to parasites. In addition, the pigeon owners were complaining of skin itching on there head. Therefore, this study was conducted to determine pathological study on parasitism in racing pigeons with an indication of its effects on community health.

Materials & Methods: This research was carried out from May to September 2011, by experimental study on 250 (168 adults and 82 nestlings) blood and faecal samples (Soulsby, 1982) randomly collected from suspected pigeons, mostly young and 25 specific free pathogen birds as control. Tissue samples of both infected and control birds were removed to compare for histological study. Moreover, 12 hair samples from candidates of pigeon owner were checked for external parasites.

Results: The data indicated prevalence rate of various helminthes including Raillietina achinobothridia (10.4%), Syngamus trachea (8.4%), Capillaria colombae (6%) and Ascaridia colombae (8.4%). The results revealed some porotozan infections including Haemoproteus colombae (20.8%), Trichomonas gallinae (26.8%) Cryptosporidium spp (1.2%) and Eimeria spp (21.6%) and also ectoparasites including Lipinus spp (3.2%), Menopen gallinae (15.2%), Ceratophyllus colombae (10.4%) and Louse fly (12%). Multiple infections were observed with internal parasites was 19/4%. However, co-infection of internal and external parasites was 24.4%. Meanwhile, 5 out of 12 of the hair samples from pigeon owners have been infected with the fleas (Ceratophyllus colombae) and lice (Menopen gallinae) with clinical manifestation of allergic urticarial reaction and itching. Histological studis showed a visible vascular congestion and a massive lymphoplasmacytic infiltration inside the smooth muscular layer of the small intestine of infected pigeons. This result indicates that racing pigeons and their owners may be at high risk of single or multiple parasitic infections.

Key words: Endoparasite, Ectoparasites, Ovum, Birds, Epidemiology.

Introduction

Pigeon are seen in more region of the world except the poles. Pigeon live side by side with human and other animal species in the nature and they are bred as a source of food as a hobby, symbol and for experimental aims [5,9].

Pigeon are probably the most common nuisance bird. Everyone knows that pigeons have adapted to life in the city, and they seem to be everywhere in urban environments. Unfortunately, the bird lovers of the world feed them, and they have developed a dependence upon people, thus reinforcing their dependency upon urban areas. They roost on roofs, ledges, almost anywhere, and they bring nesting material and leave droppings everywhere. Pigeons are swimming with filth and disease, as everyone knows [3,15]. Those who watch these birds can barely imagine how detrimental their disorderly reproduction may be and how many risk them post to human health [20].

Pigeons can carry or transmit pigeon Encephalitis, Histoplasmosis, Newcastle disease, Ornithosis, Cryptococcosis, Coccidiosis, Toxoplasmosis, Pseudo-tuberculosis, and Salmonellosis. Pigeons can carry fleas, ticks, mites, and other parasites [3,15]. It is interaction with man and other domestic and wild birds portends it as a potential carrier of zoonotic parasites [1]. Several health problems can affect pigeon, but parasite infections play a major role. Information on the parasitic infection of domesticated pigeon in

Corresponding Author
Dr. Ali Mohammad Bahrami PhD, Animal Pathology -Post-Doc, Microbiology.
Fax: 00988412224308
E-mail1: am.bahrami@ilam.ac.ir
different region of Iran appears to be poorly documented [16]. The prevalence of pigeon parasites was studied on south Khorasan, Iran, were Ascaridia colombae (16.66%), Cotugnia digonopora (13.79%), Raillietina achinobothridia (32.35%), Menopon galline (44.11%), Pseudolynchia canariensis (63.72%), Columbicola columbae (79.41%), Cryptosporidium oocyst (40.19%) and Haemoproteus colombae (47.05%). In Costa Rica, Haemoproteus spp was detected in 4.8% of birds; in Queensland, Australia, a total of 3, 059 birds were examined and Haemoproteus spp was found in 31.4% of them [21,2]. In the state of Minas Gerais, in southeastern Brazil, a research study with free living pigeons showed that all pigeons were infested with Pseudolynchia canariensis a blood feeding louse fly and with Haemoproteus colombae and Eimeria spp. oocyst. Ascaridia colombae was detected in 4.91% of pigeons and 3.27% presented with mixed infections caused by A. colombae and Raillietina spp [20].

The aim of current study was to determine the presence of ectoparasites and endoparasites in pigeon that congregate around the public squares of lages and to check the pigeon owner to see is there any relationship of common ectoparasites between the man and birds.

Materials and Methods

Study area:

Several non-official reports from different clinics, governmental veterinary headquarters and bird keeper indicated that most of the young pigeon die with suspicious of infection to parasites. In addition, the pigeon owners were complaining of skin itching on there head. Therefore, this study was conducted to determine pathological study on parasitism in racing pigeons with an indication of its effects on community health of the Ilam city, located in western part of Iran sharing 465 km common border line with Iraq country, with the sub climatically environment condition.

Birds:

This research was carried out from May to September 2011, by experimental study on 250 (168 adults and 82 nestlings) blood and faecal samples [19] randomly collected from suspected pigeons, mostly young and 25 specific free pathogen birds as control. Tissue samples of both infected and control birds for were removed to compare for histological study. Moreover, 12 hair samples from candidates of pigeon owner were checked for external parasites. The care was taken to avoid any contamination from outside to animal house, located at School of Veterinary Sciences, Ilam University.

Sampling from pigeons:

The tray at the bottom of cages of the control and experimental pigeon were completely washed and disinfected. Then lay in cages again, we had collected fresh faeces (at least 3 grams) from each bird. Data were collected according questionnaire form prepared before including information regarding, No of the birds, No of the death, No of the sick birds, weight of the birds, environmental temperature, information regarding medicine used for the bide from 30 days before, No of the feed per a day, feed ingredient, It will be necessary to mention the owner name, date of sampling and characteristic of bird, and the samples were tested in laboratory quickly.

Sampling from bird keepers

Twelve person of pigeon owner how were engaged more than 2 hours per a day with the birds and had history of etching their head, candidate for checking their hair of their head for ectoparasites to check them for their complain about etching may be its due to ectoparasites , For this propose we had close around the neck of the person with the white cloth and then the hire of the head had been combed with cotton mixed with Ether, try had been make to combed all the head from each direction, and than the cloth were shackled in the jar and then sample of the jar were proceed for identification under the microscope.

Diagnostic methods:

faecal samples of control and experimental birds were examined by direct smear method whereas egg per gram (EPG) was counted by modified McMaster technique and centrifugal flotation method using Sheather’s saturated sugar solution [19]. The ectoparasites were collected as described by Soulsby [19], briefly after killing the pigeons by anaesthesia, they were immediately placed in a polythene bag and the parasites collected after leaving the pigeons, 90% of the samples collected were dead pigeon. The nest material for ectoparasites was preserved for identification purposes in 70% alcohol. Subcutaneous nodules of each bird were fixed in 10% potassium, heated for 20 min in a jar containing water and their sediments were searched for parasite.

The blood samples were collected from control and other experimental groups of the birds using an insulin syringe inserted through a brachial vein catheter. Each sample proceeded, fixed and stained with Giemsa dyes. For diagnosis of trichomonans galliniae, wet and sterile swab were taken from surface of mouth, throat and larynx of birds and after preparation slide smears, the samples were studied under the light microscope. All parasites were identified using the parasitological keys [19].
For internal parasites entire alimentary tract, respiratory system, liver, heart, kidney and reproductive tract were searched and examine. The parasites removed and washed by water and a number of nematodes were cleared in lacto phenol for identification and cestodes were fixed in 10% formalin and stained with carmine acid for further studies. SPSS version 9.0 for Windows was used for statistical analysis of the experimental data.

**Histological study:**

Tissues of different organ including, thymus, intestine (jejenum, ceaca) liver of the infected and control birds separated and preserved in 5% formalin. Tissues were prepared for microtome, cut in 8 μM and stained in haematoxylin and eosin. Slides were studied on Olympus camera attached microscope. Observation was recorded and microphotography was done for projection slides and photographs.

**Statistical analysis:**

The computer software, SPSS Version 9.0 for windows (SPSS Inc., Chicago, IL, USA) and Chi-Square tests were used for statistical analysis.

**Results:**

Out of 250 pigeon sample 224 (89.6%) were positive with at least one of parasitic infections. Among them, 16.62% had multiple infections with internal parasites, 20.08% were infected with ectoparasites and 27.23% presented infections with both internal and external parasites. The entire experimental birds as control were free of any internal and external parasites (Table 1).

Symptoms of worms consist of weight loss and in case of severe multiple worm infestation diarrheal were seen in the pigeons. Infected young birds grow slower and were even losing much body weight resulting high rate of mortality.

The data indicated prevalence rate of various helminthes including Raillietina achinobothridia (10.4%), Syngamus trachea (8.4%), Capillaria colombae (6%) and Ascaridia colombae (8.4%). The results revealed some porotozan infections including Haemoproteus colombae (20.8%), Trichomonas gallinae (26.8%) Cryptosporidium spp (1.2%) and Eimeria spp (21.6%) and also ectoparasites including Lipeurus spp (3.2%), Menopen gallinae (15.2%), Ceratophyllum colombae (10.4%) and Louse fly (12%). Multiple infections were observed with internal parasites was 19/4%. However, co-infection of internal and external parasites was 24.4%. Meanwhile, 5 out of 12 of the hair samples from pigeon owners have been infected with the fleas (Ceratophyllum colombae) and lice (Menopen gallinae) with clinical manifestation of allergic urticarial reaction and itching (Table 2). The nest of the pigeon has been checked for external parasites and we found Ceratophyllum colombae and Menopen gallinae. The maximum and minimum environmental temperature of area measured and in order was 32 and 43°c and the maximum humidity of area was 6%.

**Histological founding:**

A comparison of control and infected tissues shows that, the thymus and intestinal tissue sample of infected young and adult birds due to infection they became very small, oedematous or with petechial haemorrhages. Histological studies showed a visible vascular congestion and a massive lymphoplasmacytic infiltration inside the smooth muscular layer of the small intestine of infected pigeons.

Multiple haemorrhages were seen in the mucosa of the intestine and ceaca. Patches of necrotic epithelial cells and multifocal areas of lymphocytic infiltrates in mucosa of jejunum of infected pigeon were observed Extensive zone of necrosis were seen in infected young pigeon. The intestinal villous atrophy and shortening of microvilli were observed in infected birds. A cross-section of liver from pigeons infected by internal parasites shows, massive congestion of central vein and also dilation of hepatic sinusoids. (Figs 1-4).

Out of 12 pigeons owner check for external parasites 5 of them they were carry lice (Menopen gallinae) and one person with fleas (Ceratophyllum colombae), all of 5 infected pigeon owner were had filling of itching their head with allergic urticarial reaction.

### Table 1: Percentage of internal and external parasites and multiple infections in pigeons

<table>
<thead>
<tr>
<th>Parasite</th>
<th>No. infection</th>
<th>Overall Percentage*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Adults n (%)</td>
<td>Nestling n (%)</td>
</tr>
<tr>
<td>Multiple infection with internal parasites</td>
<td>23 13.69 12 14.63</td>
<td>16.625</td>
</tr>
<tr>
<td>Multiple infection with external parasites</td>
<td>27 16.07 18 21.95</td>
<td>20.08</td>
</tr>
<tr>
<td>Multiple infection with internal and external parasites</td>
<td>37 22.02 24 29.26</td>
<td>27.23</td>
</tr>
<tr>
<td>Total pigeon</td>
<td>168 82</td>
<td></td>
</tr>
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</table>

* Out of 224 infected pigeon
Table 2: Prevalence of endoparasites and ectoparasites in pigeons

<table>
<thead>
<tr>
<th>Parasite</th>
<th>No. infection</th>
<th>Overall Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Adults</td>
<td>%</td>
</tr>
<tr>
<td><strong>Helminths</strong></td>
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</tr>
<tr>
<td>Raillietina spp</td>
<td>21</td>
<td>12.5</td>
</tr>
<tr>
<td>Syngamus trachea</td>
<td>19</td>
<td>11.3</td>
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<tr>
<td>Capillaria spp</td>
<td>15</td>
<td>8.92</td>
</tr>
<tr>
<td>Ascaridia colombae</td>
<td>18</td>
<td>10.71</td>
</tr>
<tr>
<td><strong>Ectoparasites</strong></td>
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<td></td>
</tr>
<tr>
<td>Lipeurus spp</td>
<td>6</td>
<td>3.57</td>
</tr>
<tr>
<td>Louse fly</td>
<td>19</td>
<td>11.3</td>
</tr>
<tr>
<td>Ceratophylus columbae</td>
<td>18</td>
<td>10.71</td>
</tr>
<tr>
<td>Menopen gallinae</td>
<td>21</td>
<td>12.5</td>
</tr>
<tr>
<td><strong>protozoan</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Haemoproteus columbae</td>
<td>42</td>
<td>25</td>
</tr>
<tr>
<td>Trichomonas gallinae</td>
<td>38</td>
<td>22.6</td>
</tr>
<tr>
<td>Cryptosporidium spp</td>
<td>23</td>
<td>13.96</td>
</tr>
<tr>
<td>Eimeria spp</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total parasites</td>
<td>243</td>
<td></td>
</tr>
</tbody>
</table>

Fig. 1: Photomicrograph showing a cross-section of a small vein of intestine from a pigeon infected by internal parasites. It shows a visible vascular congestion inside the smooth muscular layer of small intestine. (H&E 400×).

Fig. 2: Photomicrograph showing a cross-section of muscular layer of intestine from a pigeon infected by internal parasites. It shows a massive congested vessel inside the smooth small intestine. (H&E 400×).
Fig. 3: Photomicrograph showing a cross-section of mucosal layer of intestine from a pigeon infected by internal parasites. It shows villous atrophy and shortening of microvilli. (H&E 400×).

Fig. 4: Photomicrograph showing a cross-section of liver from a pigeon infected by internal parasites. It shows massive congestion of central vein and also dilation of hepatic sinusoids is obvious. (H&E 400×).

Discussion:

Parasites are emerging as a significant avian pathogen on a global scale, both ecologically and economically. However, important gaps remain in our understanding of its epidemiology and pathogenicity in wild populations, particularly in non-native hosts.

In Iran, only few studies have been carried out in relation to parasite infections in pigeons. This is the first study to compare, the prevalence and intensity rates of parasites among pigeon species in the Ilam province, western part of Iran. Categorization of birds into adult pigeon and nestling enable to show that *Eimeria spp* were significantly more prevalent in nestling than in adults, while helmintiosis due to *T. gallinae, H. colombae* and *Ceratophylus columbae*. *Eimeria spp* were significantly higher in in adults than nestling pigeon (p<0.05). Louse fly, *Ceratophylus columbae* and *Haemoproteus columbae* were significantly also higher in adults pigeon than in nestling (p<0.05). The present study is more or less resembling the result has been reported previously by and Msolle et al.[12].

The helmithes have been identified in this study including *Raillietina achinothridia, Syngamus trachea, Capillaria colombae* and *Ascaridia colombae*. Present results are similar to the previous reports that *R. achinothridia, S. trachea, C. colombae* and *A. colombae* were more pronounce than the other helmithes parasites in the pigeon [7,14,17]. *R. achinothridia* and *A. colombae* were shown to be important helmithes of pigeons. Although, this is generally considered to be relatively harmless parasites, it will be interesting to study the...
reason of pigeons to be more susceptible or helminthes a compared to other birds.

Protozoa parasites were identified in these research study were consist of *Haemoproteus colombae*, *Tichomonas gallinae*, *Cryptosporidium* and *Eimeria* that resembling reported by they work on external and internal parasites of the pigeon from east of Iran. In comparison the results of this research with previous study shows that the percentage prevalence of parasites are more less than reported by [20]. All the samples collected from *Eimeria* infected pigeons were infected by multiple parasites, showing associations between *Eimeria* sp and other parasites, that is in agreement with Tietz-Marques et al., [20]. In 13.96% of the adult’s pigeon and in 37.8% of the nestling pigeon *Eimeria* oocysts were detected. Coccidiosis is one of the important protozoan diseases of birds. The diseases has a subclinical course in adults but young pigeons exhibit such symptoms of clinical coccidiosis as fluffy feathers, anorexia and watery diarrhoea with mucus and [11]. The highest overall percentage rate of parasitic infection was *T. gallinae* (26.8%) that is in agreement with reported by Bunbury et al., [4]. The reason for high prevalence may be due to the fact that the transmission of the parasites occurs generally when the adults feed their young but can occur through food in feeders and water [10]. Adult birds may remain infected for a year or more and are a constants source of infection for their young [19]. The results of the present study demonstrated lower rates of blood parasites than the other few studies carried out in Birjand, Iran for *H. colombae*. The investigation into the prevalence of blood parasites in pigeon and other birds in Costa Rica, Alaska, and Japan revealed rates lower than 10%; in the United States, Colombia, Bulgaria and in Queensland, Australia, the prevalence rates ranged from 20 to 32% for *Haemoproteus* sp [21,2,6,13,16,8,18]. In this study we collected ectoparasites included of feather lice (Lipeurus, Menopen gallinae), pigeon fleas (Ceratophyllus columbae) and Louse fly. Radfar et al (2011) reported 4 species of ectoparasites included Pseudolynchia canariensis, Columbicola columbae, Menopen gallinae and Laminiosiopites cysticola from east of Iran.

In this study 5 persons reported with lice and fleas (same species of parasites had been collected from the pigeons nest) and all of them had itching in their head and allergic urticarial reaction, Haag wackermagel (2004) has reported concerns a married couple who were repeatedly invaded by pigeon fleas (*Ceratophyllus columbae*) over a period of 2 months. The source of the fleas was a pair of breeding pigeons (*Columba livia*). The birds’ nest was located in the attic immediately above the couple's apartment, and the fleas found their way along an unsealed heating pipe. The people encountered up to 40 bites per night. With invasions repeated almost every night, the man gradually developed an allergic urticarial reaction. The most traumatic experience for the couple, however, was to learn that they were invaded by fleas (initially, they had presumed they were bothered by mosquitoes). This information resulted in severe psychological distress with phobic reactions and insomnia. Despite the successful removal of the fleas and the pigeons that were source of the pest, parasitophobia of the man persisted over the following 4 months. This case is discussed from the broader aspect of health risks related to pigeons and animal fleas.

Conclusion:

Clean, sanitary lofts are most beneficial to keeping worms in check, but since pigeons often mingle with many hundreds of other birds, a bird can become infested through ingestion of worm eggs from the basket or through contact with stray pigeons. Therefore, it is advisable to develop a preventative worming program in which all birds are wormed at least twice a year. Use of mask and cap for pigeon owner could protect them from allergic reaction.

Acknowledgments

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References