PARASITES OF DOMESTIC (COLUMBA LIVIA DOMESTICA) AND WILD (COLUMBA LIVIA LIVIA) PIGEONS IN NİĞDE, TURKEY

BARIS SARI, BILGE KARATEPE¹, MUSTAFA KARATEPE¹, AND MURAT KARA

Department of Parasitology, Faculty of Veterinary Medicine, University of Kafkas, 36040, Kars, Turkey
¹ Bor Higher School for Business, Nigde University, Bor, 51700, Nigde, Turkey
bsari67@hotmail.com, bsari6767@yahoo.com

Received for publication March 21, 2008

Abstract

Faecal samples were taken from 251 pigeons (136 domestic pigeons and 115 wild ones). The samples were examined through the centrifugal flotation method using Sheather’s saturated sugar solution. In addition, all the samples were examined for Cryptosporidium oocysts by using a modified acid-fast staining method. Coccidia oocysts were detected in 81 (59.6%) domestic pigeons and in 35 (30.4%) wild pigeons. Coccidian species identified in domestic pigeons were as follows: Eimeria labbeana (58.1%); E. columbarum (30.9%); E. columbae (22.1%); and Isospora sp. (18.4%). In wild pigeons, the oocysts of the following species were detected: Eimeria labbeana (28.7%), E. columbarum (10.4%), E. columbae (5.2%), and Isospora sp. (13.0%). Helminth eggs were found in faeces of 32 (23.5%) domestic pigeons and in five (4.3%) wild pigeons. The following helminth species were identified: Capillaria sp. (19.9%) Ascaridia columbae (5.1%), and Heterakis sp. (3.7%) in domestic pigeons; and Capillaria sp. (4.3%) and Syngamus sp. (1.7%) in wild pigeons. Cryptosporidium oocysts were not observed in the faecal samples of both domestic and wild pigeons.

Key words: domestic pigeons, wild pigeons, coccidia, helminths, Turkey.

Pigeons, whose relation with humans traces back to ancient times (B.C 3000-5000), are seen in almost every geographical region of the world except for the poles. Pigeons live side by side with humans and other animal species in the nature; and they are bred as a source of food, as a hobby, symbol, and for experimental aims (4, 12). These birds, especially wild pigeons, are of concern since they have a role in spreading some zoonoses to people as well as being a reservoir of many parasitic diseases for poultry (4, 17, 27, 36). In many regions of the world, it has been reported that coccidiosis and helminth infections are common in pigeons (12, 14, 19-21, 33, 36). In addition, Cryptosporidium species that are known as water borne zoonotic protozoans seen in humans and many of the domestic animals are also encountered in pigeons (17, 29, 30, 34). It has been emphasised that in the epidemiology of cryptosporidiosis, many waterfowls as well as the wild pigeons have an important role (34).

Coccidiosis is one of the important protozoan diseases of birds, and the most common coccidian species in pigeons are Eimeria labbeana, E. columbarum, E. columbae, and E. tropicalis (15, 21, 26, 33). The disease has a subclinical course in adults but young pigeons exhibit such symptoms of clinical coccidiosis as fluffy feathers, anorexia, and watery diarrhoea with mucus (14, 16, 21). Nematodes are among the primary endoparasitic problems of pigeons. According to the various studies performed in different regions of the world, Ascaridia columbae, Capillaria sp., Dispharynx sp., and Tetrameres sp. were commonly identified in pigeons (5, 6, 9, 12, 22, 31). Four species were isolated from the birds: Cryptosporidium baileyi, C. meleagridis, C. parvum, and C. galli (30, 34).

This study was performed to determine the prevalence of possible parasites in the faecal samples of the domestic and wild pigeons in the Nigde region and to obtain information about the effects of some factors such as season and gender on parasitic infections.

Material and Methods

Study area. This research was performed in the Mezbaha and Tepe districts of the Nigde city. The city of Nigde is located in the Central Anatolia. Its provincial area is 7,312 km². It is at an altitude of approximately 1,200 m. The climate in Nigde province is subtropical continental with the annual average temperature about 11ºC. Nigde winters can be extremely cold. It has hot summers with temperatures varying only slightly.

Collection of the samples. Faecal samples were collected from 251 pigeons over one year of age, 136 of which were domestic and 115 were wild pigeons.
The samples were collected between October 2003 and November 2005. The samples from wild pigeons were collected from the pigeons caught on the roofs of buildings such as hospitals and schools in the Nigde city centre and put into separate cages to obtain fresh faeces. The faecal samples of domestic pigeons were collected from birds kept in cages. After collecting the faecal samples, all the pigeons were released. The faecal samples were taken to laboratories as soon as possible.

**Examination of the samples.** After three washes of the faecal samples, the sediment from each sample was mixed with Sheather’s saturated sugar solution, centrifuged and then examined under a microscope for the presence of protozoan oocysts. Samples containing coccidian oocysts were mixed with 2.5% potassium dichromate in Petri dishes and left at room temperature for the sporulation of oocysts to take place. Coccidian species were identified according to the size and morphological characteristics of the oocysts (the shape and colour of the oocysts; thickness of the oocyst walls; presence of micropyle, cap, polar granules, oocyst or sporocyst deposits; size and shape of the sporocysts; shape of Stieda bodies and of sporozoites; etc.). The identification of each species was made with reference to the measurements of 25 to 50 oocysts from at least five hosts (or from the total number of hosts if less than five) under a microscope (Olympus) with a camera attachment (15, 21, 26, 33). After that, helmint eggs were also detected and identified according to their morphological features (11, 35, 36). In addition, all the faecal samples were examined for Cryptosporidium oocysts by the modified acid-fast staining method (24).

**Statistical analysis.** Statistical analysis related to the obtained results was performed using the Statistical Packet for Social Sciences (SPSS) and the $\chi^2$-square test.

### Results

Four coccidian and four helminth species were detected in the faecal samples of both domestic and wild pigeons. Surprisingly, the rate of infection was quite higher in domestic pigeons. In 59.6% of the domestic pigeons (81/136) and in 30.4% of the wild pigeons (35/115), coccidia oocysts were detected ($P<0.05$). *Eimeria labbeana* and *E. columbarum* were found to be the most common species in domestic pigeons and *E. labbeana* and *Isospora* sp. were the most common species seen in the faecal samples of wild pigeons. Helmint eggs were identified in 23.5% (32/136) in the faecal samples of domestic pigeons and in 4.3% (5/115) in the faecal samples of wild pigeons ($P<0.05$). Four different nematode eggs were seen in domestic and wild pigeons, and the most common species among the nematode eggs was found to be *Capillaria* sp. (Table 1).

As can be seen in Table 2, in both domestic and wild pigeons, native infections with single species (coccidia) were more common comparing to mixed infections (coccidia + helmintes). In addition, infections with single helmint species were not encountered in both domestic and wild pigeons.

When the data were evaluated with regard to the infection with a single or mixed parasite species in both domestic and wild pigeons, respectively, the following percentage values were found: one species (23.5%, 28.6%), two species (30.9%, 48.6%), three species (18.5%, 17.1%), four species (14.8%, -), five species (8.6%, 2.9%), and six species (3.7%, 2.9%).

### Table 1

Identified coccidia and helminth species and their prevalence in domestic and wild pigeons

<table>
<thead>
<tr>
<th>Coccidia species</th>
<th>Domestic pigeon</th>
<th>Wild pigeon</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number of infected pigeons</td>
<td>Number of infected pigeons</td>
</tr>
<tr>
<td><em>E. labbeana</em></td>
<td>79 (58.1%)</td>
<td>33 (28.7%)</td>
</tr>
<tr>
<td><em>E. columbarum</em></td>
<td>42 (30.9%)</td>
<td>12 (10.4%)</td>
</tr>
<tr>
<td><em>E. columbae</em></td>
<td>30 (22.1%)</td>
<td>6 (5.2%)</td>
</tr>
<tr>
<td><em>Isospora</em> sp.</td>
<td>25 (18.4%)</td>
<td>15 (13.0%)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Helminth species</th>
<th>Domestic pigeon</th>
<th>Wild pigeon</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>A. columbae</em></td>
<td>7 (5.1%)</td>
<td>-</td>
</tr>
<tr>
<td><em>Heterakis</em> sp.</td>
<td>5 (3.7%)</td>
<td>-</td>
</tr>
<tr>
<td><em>Syngamus</em> sp.</td>
<td>-</td>
<td>2 (1.7%)</td>
</tr>
<tr>
<td><em>Capillaria</em> sp.</td>
<td>27 (19.9%)</td>
<td>4 (3.7%)</td>
</tr>
</tbody>
</table>

n - total number of faecal samples.

### Table 2

Types of coccidial and helminth infections in domestic and wild pigeons

<table>
<thead>
<tr>
<th>Infection type</th>
<th>Domestic pigeon</th>
<th>Wild pigeon</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>x/n</td>
<td>%</td>
</tr>
<tr>
<td>Single infections (coccidia)</td>
<td>47/81</td>
<td>58.0</td>
</tr>
<tr>
<td>Mixed infections (coccidia+helmintes)</td>
<td>34/81</td>
<td>42.0</td>
</tr>
</tbody>
</table>

x - number of infected animals, n - total number of infected animals.
When the infections were evaluated depending on the gender, it was found that the infection rates of males and females were very close to each other (P>0.05). In the domestic pigeons, the month with maximum infection rate was October (73.9%) and minimum rate was recorded in November (46.2%). The infection rate in autumn in domestic pigeons was found to be rather high (59.2%) compared to the infection rate of wild pigeons (30.4%) (P<0.05). Cryptosporidium oocysts were not detected in both domestic and wild pigeons.

Discussion

In Turkey, a limited number of studies have been performed in relation to coccidiosis and helminth infections in pigeons. It was reported that E. pfeifferi as a coccidian species, some trematodes and cestodes as well as nematodes (19.3% of Capillaria obsignata and 14.6% of Ascaridia columbae) were found in wild pigeons nesting at famous mosques of Istanbul (23). It was determined that Ascaridia columbae and Capillaria sp. infections are common in domestic pigeons in Istanbul (1). In a study carried out in Elazığ, mixed infections of E. labbeana and E. columbarum were seen in wild pigeons (15.1%) (18). In another study performed in Ankara and its surrounding area in wild pigeons, one trematode, four cestodes, and three nematodes (Capillaria columbae - 3.5%, Ascaridia columbae - 2%, and Dispharynx nasuta - 0.5%) were identified and the infections were found to be more common in adults. The infection rate determined at necropsy was 10 times higher, and the number of species found was four times higher than those determined during coproscopic examination (9). In another study performed in the Bursa region in domestic pigeons, Ascaridia columbae prevalence was reported to be 42% (31).

The most common coccidia species were found to be E. labbeana and E. columbarum in the studies performed all over the world (14, 16, 20, 21, 28, 37), and E. columbae was reported to be encountered in India (21, 32), Poland (28), and Yugoslavia (20), and E. tropicalis was reported to be only encountered in India (15, 21). In the studies related to domestic and wild pigeons in the world, various cestode and trematode infections were found, but nematode infections were first. According to necropsy and faecal examinations, the most common nematodes were found to be Ascaridia columbae and Capillaria species (3, 6-8, 22, 27). Additionally, Syngamus (3, 25, 37) and Heterakis (2, 25) infections, which are common in other birds, were reported to be found in doves and pheasants.

In this study, high rates of E. labbeana and E. columbarum oocysts determined in both wild and domestic pigeons were in accordance to other studies performed in Turkey (18, 23); but the detection of E. columbae and Isospora sp. oocysts was in contrast to the studies. The eggs of Ascaridia columbae were only found in domestic pigeons; and Capillaria sp. were demonstrated in both domestic and wild pigeons. The eggs of Syngamus sp., which were reported to be rarely seen in pigeons all over the world, were found in faecal samples of wild pigeons and Heterakis sp. eggs were detected in the faecal samples of domestic pigeons.

In our study, it was surprisingly seen that the rate of the infection of domestic pigeons was higher than that of wild pigeons. It is thought that this situation could be due to raising and feeding domestic pigeons in crowded small poultry houses with other poultry.

Cryptosporidium infections commonly seen in the birds were reported to be found especially in young pigeons rarely at low rates (17, 29, 30, 34). All of the faecal samples examined in this study belonged to pigeons aging over a year, and since the examination was made only by the modified acid-fast staining method, it brings to mind that this may be insufficient in the detection of Cryptosporidium oocysts.

There are limited numbers of studies concerning the influence of age, gender, and seasonal factors on coccidial and helminth infections in pigeons (9, 10, 13, 19, 20, 31). Four different species of nematode eggs were found in this study. This is compatible with other studies claiming that nematode infections were common among the old pigeons (10, 19) and the prevalence of nematode infections in pigeons is quite high comparing to other birds (6, 31).

With this study, it has been proved that gender factor is not important in coccidial or helminth infections in wild and domestic pigeons but seasonal factor is a statistically significant one. Previous reported studies put forward that the effect of gender was also unimportant for helminth infections in pigeons (9, 31). Helminth infections were more commonly observed during the autumn and winter, and abundant rain along with a mild winter create a suitable environment for the development of helminth eggs (31). In our study, the maximum infection rate in pigeons was seen in October (73.9%), and the minimum infection rate was seen in November (46.2%). The infection rates in autumn and spring were very close to each other. In the city of Nigde, the maximum rainfall is seen in April, May, and October. Infections in autumn were more common in domestic pigeons comparing to the wild ones.

The oocyst of E. columbae and Isospora sp. oocysts and the eggs of Heterakis and Syngamus sp. were identified for the first time in Turkey in this study. Isospora sp. oocysts, the eggs of Heterakis sp. and Syngamus sp. identified in our study were found in many bird species and thus it is considered that pigeons may be infected through direct contact with these animals.

When we interviewed pigeon owners, we saw that most of them were not aware of treating the domestic pigeons for parasitic diseases, and some do not treat them at all. Based on our observations, we advise two strategic treatments per year in domestic pigeons in the area; the first one in March, and the second one in October.

It is concluded that coccidia oocysts and some nematodes species are common in domestic and wild pigeons in the city of Nigde. The prevalence of these
infections in pigeons can be better recognised by performing a more extensive study in which necropsies must be done that will enable finding adult parasites as well. Specific precautions must be taken against parasitic infections especially in domestic pigeons considering that these animals are in contact with other poultry.

References