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Parasites of feral pigeon (*Columba livia*) by fecal examination from some areas in Seoul, Korea

Se-Min Kim¹, Sang-Eun Lee², Neunghee Kim³, Hera Kim³, Youngseob Kim³, Juhyoung Lee³,
Shin-Hyeong Cho², Won-Ja Lee², Bae-Keun Park⁴, Bae-Dong Jung⁵, Hyeon-Cheol Kim^{5*}

¹Foreign Affairs Intelligence Division, Foreign Affairs Bureau, Korean National Police, Seoul 120-020, Korea

²Division of Malaria & Parasitic Diseases, Korea National Institute of Health, Osong 361-951, Korea

³Seoul Metropolitan Government Research Institute of Public Health and Environment, Gwacheon 427-070, Korea

⁴Research Institute of Veterinary Medicine, College of Veterinary Medicine, Chungnam National University, Daejeon 305-764, Korea, ⁵College of Veterinary Medicine, Kangwon National University, Chuncheon 200-701, Korea

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Abstract

This study was conducted to evaluate the prevalence of helminth parasites from collected fecal samples of 410 feral pigeons (*Columba livia*) in 3 different areas of Gwangjin-gu, Seongdong-gu and Dongdaemun-gu in Seoul from December, 2011 to July, 2012 in Korea. The fecal samples were examined through by the centrifugation method using formalin-ether solution. The overall prevalence of parasites in the pigeons was 29.27% (120/410). Two nematodes (*Tetrameres* spp. and *Capillaria* spp.) and one protozoa (*Eimeria* spp.) were identified. In the case of nematodes, *Tetrameres* spp. dominated numerically (58, 14.15%), followed by *Capillaria* spp. (10, 2.44%) and oocysts of *Eimeria* spp. were detected in 78 cases (19.02%). This investigation introduces the result of examination on the prevalence of parasites in feral pigeons from some areas in Seoul for the first time.

Key words : *Tetrameres*, *Capillaria*, *Eimeria*, Fecal examination, Feral pigeon, Seoul

INTRODUCTION

Pigeons (Order Columbiformes) are worldwide free living species and can be found in virtually every town and city around the globe (Marques et al, 2007). They have adapted to life in urban, suburban and rural environments. Feral pigeons may be infected with many organisms, some of which are pathogenic to humans (Mushi et al, 2000). Especially wild pigeons could spread the zoonoses and parasites to people or other birds because they can fly long distances (Cooper, 1984; Piasecki, 2006). For example, pigeons can carry or transmit encephalitis, histoplasmosis, Newcastle disease, pigeon ornithosis, cryptococcosis, pigeon coccidiosis,

toxoplasmosis, pseudo-tuberculosis and salmonella food poisoning (Rehman, 1993; Opara et al, 2012). And also, pigeons can carry fleas, ticks, mites and other parasites (Balicka-Ramisz et al, 2007; Rehman, 1993).

They are often the cause of discomfort due to the accumulation of their droppings. That is, humans are infected by inhaling fecal dust from cages or from sites that have been contaminated with dry feces, urine and other droppings. This usually occurs among breeders, veterinarians, industrial workers and cleaning worker (Marques et al, 2007).

There are well documented data on the parasitic infection status of the wild and domestic pigeons from different parts of the world (Olsen and Braun, 1980; Begum and Sheikh, 1987; Bernard and Blesemans, 1987).

Ecological information about the habitat, behaviour and

*Corresponding author: Hyeon-Cheol Kim, Tel. +82-33-250-8677,
Fax. +82-33-250-8596, E-mail. advsv@kangwon.ac.kr
The first two authors contributed equally to this work.

diversity of Korean feral pigeons is well known (Yoon et al. 2005a; Yoon et al. 2005b; Kim and Lee, 2007). But no information is available on internal parasites of the feral pigeons in Korea though there is only one report on pruritus caused by infection of external parasites (Lee et al. 2006). Therefore the parasitological survey of the feral pigeons is essential for the improvement of public health. Although this survey didn't cover the whole areas of Seoul, it was to determine the prevalence of parasites in the fecal samples from the feral pigeons in Seoul, Korea.

MATERIALS AND METHODS

From December 2011 to July 2012, a total number of 410 feral pigeon's fecal samples were collected in 3 different regions; Gwangjin-gu (69), Seongdong-gu (156) and Dongdaemun-gu (185) of Seoul city (Fig. 1). The

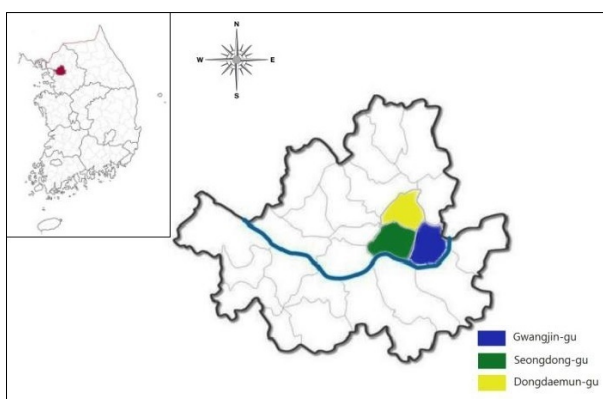


Fig. 1. The collecting sites of fecal samples from feral pigeons in Seoul, Korea.

faeces (at least 3 gms) at the bottom of the ground were collected in clean sterile 50 mL centrifuge tubes and were transferred to the Department of Parasitology, College of Veterinary Medicine, Kangwon National University. The fecal samples were examined by sedimentation method using formalin-ether solution.

RESULTS

Of the 410 fecal samples examined, 120 (29.27%) cases were infected with internal helminths or protozoa. A total of two different nematodes and protozoan parasites were isolated from the fecal samples and identified. In this study the parasites have been identified with *Tetrameres* spp., *Capillaria* spp. and *Eimeria* spp. even though it is difficult to identify only through fecal examination.

The prevalence of parasitic infection in feral pigeons has been shown in Table 1. Gwangjin-gu had the highest prevalence (71.01%) followed by Seongdong-gu (37.82%). The prevalence at Dongdaemun-gu (6.49%) was considerably low (Table 1). The most common species was *Eimeria* spp. (19.02%) and followed by *Tetrameres* spp. (14.15%) and *Capillaria* spp. (2.44%). Multiple infections were observed in 25 cases (6.10%) (Table 2).

The embryonated eggs of *Tetrameres* spp. were ellipsoidal in outline and measured from 50 to 60 (55) μ m in length and 28 to 32 (30) μ m in width. Its wall has considerable thickness and with a protruding polar plug at each pole (Figs. 2A and B). The capillarid eggs have

Table 1. Prevalence (%) of internal parasites of feral pigeons in each district in Seoul

Parasites	Gwangjin-gu		Seongdong-gu		Dongdaemun-gu		Total	
	No of infected (n=69)	%	No of infected (n=156)	%	No of infected (n=185)	%	No of infected (n=410)	%
Uninfected	20	28.99	97	62.18	173	93.51	290	70.73
Nematoda								
<i>Tetrameres</i> spp.	30	43.48	27	17.31	1	0.54	58	14.15
<i>Capillaria</i> spp.	3	4.35	1	0.64	6	3.24	10	2.44
Sub total	33	47.83	28	17.95	7	3.78	67	16.34
Protozoa								
<i>Eimeria</i> spp.	38	55.07	34	21.79	6	3.24	78	19.02
Infected	49	71.01	59	37.82	12	6.49	120	29.27

Table 2. Complicated-prevalence of internal parasites in feral pigeons of each districts in Seoul

Type of infection	Districts and infection rates (%)			Total (%)
	Gwangjin-gu	Seongdong-gu	Dongdaemun-gu	
Sample No. (%)	69 (100)	156 (100)	185 (100)	410 (100)
Uninfected	20 (28.99)	97 (62.18)	173 (93.51)	290 (70.73)
Single	29 (42.03)	55 (35.26)	11 (5.95)	95 (23.17)
Double	18 (26.09)	4 (2.56)	1 (0.54)	23 (5.61)
Triple	2 (2.90)	—	—	2 (0.49)

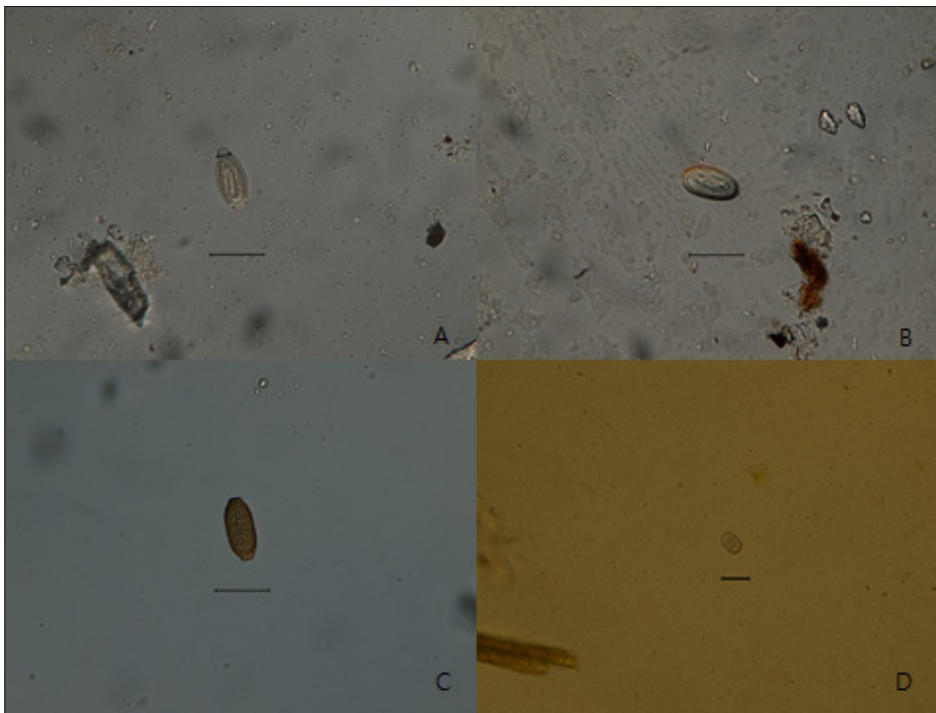


Fig. 2. Eggs from the feces of feral pigeons (x400). (A) Egg of *Tetrameres* spp. Note the embryonated egg has protruding polar plug at each pole. Bar=50 μ m; (B) The embryonated egg of *Tetrameres* spp. showing weak polar plug at each pole. Bar=50 μ m; (C) The barrel-shaped egg of *Capillaria* spp. Bar=50 μ m; (D) Oocyst of *Eimeria* spp. Bar=25 μ m.

bipolar plugs and thick shells. The eggs measured from 47 to 49 μ m in length and 27 to 29 μ m in width and were barrel-shaped with clear plugs on each pole (Fig. 2C). The oocysts of *Eimeria* spp. were oval in outline, measured from 16 to 21 μ m in length and 13 to 17 μ m in width (Fig. 2D).

DISCUSSION

It is well known that feral pigeons can be easily infected with many parasite species without specific clinical signs (Toro et al, 1999). Although many birds do not show any clinical signs of diseases, they may be a continuous infection source to other animals. There are some reports about the bacterial disease that was trans-

mitted to people from wild pigeons (Glunder, 1989; Mushi et al, 2001).

The infection rate of intestinal parasites among 410 feral pigeons in Seoul was 29.27%, which indicated a relatively low prevalence compared with previous studies. Mushi et al. (2000) found the presence of coccidia oocysts in 40.0%, *Ascaridia columbae* in 30.0% and *Dispharynx spiralis* in 10.0% of the faecal samples examined from the companion birds keeping in the cages. Dovč et al. (2004) reported that *Eimeria* spp. was identified in 71.9%, *Capillaria* spp. in 26.6% and *A. columbae* in 4.3% of fecal samples examined in domestic pigeons.

The genus *Tetrameres* Creplin, 1846 are largely known as proventricular parasites of a wide range of domestic and wild birds and they have been reported from nearly

300 species of birds belonging to at least 20 orders (Mollhagen, 1991). Heavy infections of *Tetrameres* spp. may cause anemia, inability to digest food properly, weight loss, weakness and death, because of the blood sucking activity of this nematode and the loss of glandular function (Riley, 1973; Ramaswamy and Sundaram, 1981; Mollhagen, 1991).

In the present survey, the eggs of *Tetrameres* spp. were detected in the feces of feral pigeons around Seoul. The eggs were ellipsoidal, had a protruding polar plug at each pole and contained fully-developed larva. Fink et al. (2005) reported that the eggs of *T. americana* revealed characteristic polar ends and a relatively thick shells harbouring the coiled L1 larvae. Morphological features of the embryonated eggs in this study are the same as those of *T. americana* recorded by Fink et al. (2005). Especially, the parasites of genus *Tetrameres* had not been reported from any wild birds in Korea.

Capillarid nematodes were roundworms that infect poultry and numerous other wild mammals and birds. About 300 species of this genus have been described. They produce a characteristic barrel-shaped bipolar egg that allows identification to genus level (Scullion, 2013). So we could not identify the species of these eggs.

Coccidia are protozoa that are common pathogens in pigeons. The three types of coccidia known to affect pigeons are *Eimeria columbae*, *E. columbarum* and *E. labbeana* (Balicka-Ramisz and Pilarczyk, 2014). In this study, the identification of the species was not done.

This is the first epizootiological report focusing on the status of parasitic infection among feral pigeons in Korea. Although the parasitic infection rate in feral pigeons had relatively low, these birds could be important in the transmission of the parasites to other kinds of animals. Because no parasitological studies of the feral pigeons have been conducted previously in Korea, we present the results of the efforts to assess current conditions and provide baseline data for future research. Considering to role of pigeons as a risk factor for human and poultry health, more studies should be needed to investigate a parasitic infection of pigeons in other regions in Korea.

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