Investigation on Parasitic Helminthes of Gastrointestinal, Liver and Lung of Domestic Pigeons (*Columba livia*) in Urmia, Iran

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**Abstract**

A study was conducted to evaluate the prevalence and distribution of helminthes parasites of pigeons from May 2011 to March 2012 in different parts of Urmia, Western Azerbaijan, Iran. Total of 138 pigeons were examined. The overall parasite prevalence in pigeons was 23.18%, with specific prevalence for Ascaridia columbae being 13.04% followed by species of Raillietina echinobothrida (10.14%), R. tetragona (2.89%), R. magninomida (1.44%) and Capillaria spp (0.72%). The infection rate in female and male pigeons was 21 (65.62%) and 11 (34.37%), respectively which had significant differences (P<0.01). No helminthes parasite was found in liver and respiratory tracts. No trematode infection was detected. Highest prevalence of infection was in spring and winter. Among all examined organs jejunum had maximum infection density especially with R. echinobothrida and A. columbae. Single infection was more common (18.84%) than double (3.62%) and triple infections (0.72%). The results of present study concluded that pigeons had relatively low infection rate. According to ability of this host species in transmission of some zoonotic agents to other poultry flocks and human further studies are recommended to evaluation the occurrence and the effects of the parasites on the pigeons’ health and production.

**Keywords:** Helminthes, Pigeon, Gastrointestinal, Nematode, Cestode, Urmia, Iran.

**Introduction**

Pigeons are domesticated birds which widely distributed the entire world. They have adapted to life in urban, suburban and rural environment and have close communication with humans. In Iran, the most common dietary protein sources are livestock and poultry productions and little attention has been pied to other birds, and pigeons commonly used for ornamental aspects, pets and entertainment. On the other hand, because pigeons are able to fly much distances, they can carry many parasites and pathogens to other poultry flocks such ascoccidiosis, cryptococcosis, newcastle disease and histoplasmosis (Rehman, 1993; Opara et al., 2012). Also, they can serve as a source of zoonotic agents for human (Vucemilo et al., 2000; Karatepe et al., 2010). Pigeons feed on a wide variety of food items, which include grains, slugs, earthworm and insects (Adang, 1999). Several ecto and endoparasite have been involved in causing morbidity and mortality in these birds (Cheng, 1973; Soulsby, 1982). Severe infections generally lead to weakness, loss of
weight, anaemia and diarrhoea (Cheng, 1973). There was well documented data on parasites occurrence of wild and domestic pigeons from different part of the world that indicate wide range of helminthes, protoza and arthropods infection (Olsen and Braun, 1980; Begum and Sheikh, 1987; Bernard and Blesemans, 1987). Since the knowledge about prevalence of parasites is essential for management purposes and improving public health, therefore the present study aimed to investigate the prevalence and distribution of pigeon helminths in the Urmia, Iran, for the first time.

**Materials and Methods**

A total number of 138 pigeons were collected from May 2011 to March 2012. These birds were trapped alive from different areas of Urmia city, Western Azerbaijan, Iran. Then, the birds were transferred to parasitology laboratory, Faculty of Veterinary Medicine, Urmia University, Urmia and euthanized. At necropsy, each section of gastrointestinal tracts of the bird was opened, separately, then removed contents were examined under a stereo microscope for parasite helminthes. The respiratory tract was opened and the internal surface of the trachea was inspected. All nematodes removed from mentioned organs were placed in AFA solution (alcohol, formaldehyde, acetic acid, distilled water, and glycerine), and then cleared with lactophenol (25% glycerine, 25% lactic acid, 25% phenol and 25% distilled water). Cestodes removed from small intestine were stained with acidified alum/carmine. Identification of the species was confirmed on the basis of light microscopic examination with reference to keys (Soulsby, 1986).

**Statistical analysis**

The parasitological parameters including percentage prevalence, the mean intensity and the mean abundance were evaluated (Bush et al., 1997). One-way ANOVA (SPSS version 19.0 for windows) was used to compare the prevalence of endoparasite between sexes and frequency of infection. Significance at $P \leq 0.01$ was used in all tests.

**Results**

Out of the 138 pigeons examined, 32(23.18%) were infected by five species of parasite helminthes comprising three species of cestodes and two species of nematodes (Table1). The species of cestodes were included *Raillietina echinobothrida* (10.14%), *R. tetragons* (2.89%) and *R. magninomida* (1.44%), while the nematodes were *Ascaridia columbae* (13.04%) and
Capillaria spp (0.72%). There was no infection in respiratory tract and liver. Infection rate in female and male pigeons were 11 (34.37%) and 21 (65.62%), respectively. Significant difference was observed between sexes of birds (P≤0.01).

Among examined organs the jejunum had maximum infection density especially with A. clumbae and R. echinobothrida (Figure 1). The highest prevalence of infection was in spring and winter. The pigeons had higher prevalence of single infection (18.84%) compared to double (3.62%) and triple infections (0.72%).

Table 1 - Prevalence, intensity and abundance of parasite helminthes removed from infected organs (#138)

<table>
<thead>
<tr>
<th>Parasite species</th>
<th>Prevalence (%)</th>
<th>Mean intensity (±SD)</th>
<th>Mean abundance (±SD)</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Raillietina echinobothrida</td>
<td>14(10.14)</td>
<td>5(±4.5)</td>
<td>0.5(±2.05)</td>
<td>1-14</td>
</tr>
<tr>
<td>R. tetragona</td>
<td>4(2.9)</td>
<td>3.75(±2.36)</td>
<td>0.1(0.7±)</td>
<td>2-7</td>
</tr>
<tr>
<td>R. magninomida</td>
<td>2(1.44)</td>
<td>4.5(±4.9)</td>
<td>0.6(±0.68)</td>
<td>2-8</td>
</tr>
<tr>
<td>Ascaridia columbae</td>
<td>18(13.04)</td>
<td>10.33(±17.5)</td>
<td>1.34(±7.1)</td>
<td>1-74</td>
</tr>
<tr>
<td>Capillaria spp</td>
<td>1(0.72)</td>
<td>2(±)</td>
<td>0.1(±0.17)</td>
<td></td>
</tr>
</tbody>
</table>

Figure 1 - Ratio of the infection site of the examined pigeons with parasite helminthes.

The differences in the prevalence of single (Table 2), double and triple infections were significant (P≤0.01).
Table 2 - The frequency of mixed infection in examined pigeons

<table>
<thead>
<tr>
<th>Mixed helminthes infection</th>
<th>Prevalence(%)</th>
<th>total=32</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Single infection</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>R. echinobothrida</td>
<td>8(25)</td>
<td></td>
</tr>
<tr>
<td>R. tetragona</td>
<td>2(6.25)</td>
<td></td>
</tr>
<tr>
<td>A. clumbae</td>
<td>16(50)</td>
<td></td>
</tr>
<tr>
<td><strong>Double infection</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>R. echinobothrida + A. clumbae</td>
<td>2(6.25)</td>
<td></td>
</tr>
<tr>
<td>Capillaria spp + R. echinobothrida</td>
<td>1(3.12)</td>
<td></td>
</tr>
<tr>
<td>R. tetragona + R. echinobothrida</td>
<td>1(3.12)</td>
<td></td>
</tr>
<tr>
<td>R. magninomida + R. echinobothrida</td>
<td>1(3.12)</td>
<td></td>
</tr>
<tr>
<td><strong>Triple infections</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>R. echinobothrida + R.tetragona + R. magninomida</td>
<td>1(3.12)</td>
<td></td>
</tr>
</tbody>
</table>

**Discussion**

The present investigation demonstrated that 23.18% of all examined pigeons were infected with helminthes. The prevalence of helminthic infections recorded in this study is considered modestly. Previous surveys on helminth parasites in pigeons in Iran and the world are partially comparable with the results in the current study. In our study highest and lowest infections were with *A. clumbae* and *Capillaria* spp, respectively, which resemble to the study carried out by Ashrafihelan et al., (2010) on pigeons in Tabriz who were reported the same there species of cestodes and two species of nematode. Borghare et al., (2009) displayed heavy infection with *Capillaria* spp, *Ascaridia* spp and *Hetarakis* spp in wild pigeons at Maharajbagh Zoo, Nagpur (Borghare et al., 2009), while other findings from different parts of Iran revealed that cestodes were more common than nematode which were in contrast to our results. Shayeste (1996) reported that 70, 9, and 1 percent of examined birds were infected with *R. echinobothrida*, *R. tetragona*, and *A. clumbae*, respectively. The examined pigeons in southwest regions of Iran showed infection with *A. clumbae* (16.66%), *Hadjelia truncate* (1.96%)

*Cutoginia digonopora* (13.79%), *R.tetragona* (32.35%) and *R. magninomida* (18.62%) as well as several ectoparasites (Radfar et al., 2011). Low infection rate of present study may be related to low population density of intermediated hosts which implicate in the life cycle of helminthes. However, light infection with helminthes can be due to development of host immune response against reinfection (Adand et al., 2008). We found no trematode in present study. Other reports
on parasitic infection in pigeons in Iran and other regions of the world were similar to current investigation (Shayeste, 1996; Adang et al., 2008; Natal et al., 2009; Msoffe et al., 2010; Ashrafihelan et al., 2010; Derakhshanfar et al., 2010; Radfar et al., 2011). Among all data about parasite fauna in pigeons, there was only one report of trematode infection with the species of *Echinostoma revolutum* (25%) in the world (Musa et al. 2009). Addition to pigeons, studies on chickens in Urmia, on native fowl in Khuzestan displayed that *Ascaridia galli*, *Hetrakis galinarum* and *R.echinobothrida* were the most common parasites which were nearly in agreement with our study (Naem et al., 2005; Nabavi et al., 2005). Before Hoseini et al., (1986) have already found heavy infection in gees population in Gilan province (Hoseini et al., 2001). Later, another investigation on in chikens in Golestan indicated that 96% of the examined fowl harbored at least one species of parasite (Eslami et al.,2009). Thus the results suggested that parasitic infection in other birds were higher than pigeons in different regions of Iran. The possible reason may be related to the type of host dietary habitat and immune mechanism. In present investigation, the prevalence of infection in male pigeons was higher than females and had significant variation that incompatible to Senlik et al., (2005) and Adang et al., (2008), which reported no correlation between sexes of pigeons. There was no infection in respiratory organ in examined birds in our study. Tracheal worm, *Syngamus trachea*, is relatively common in wild and domestic fowl such as turkeys, chickens, pheasants, and perching birds. Heavy infection cause direct mechanical damage to the mucosa and produce hemorrhage and high mortality (Fernando and Barta, 2008). This parasite together with other species (*Raillietina* spp, *C. clumbae*, *Tetramers* spp, *A. clumbae*, *H. clumbae*, *Menopen gallinae*, *Ceratophyllus columbae*, Louse fly) were found in pigeons in Ilam (Bahrami et al., 2012), which was in contrast of the present study and other surveys (Radfar et al. 2011; Al-Barwari and Saeed 2012; Musa et al., 2009; Msoffe et al.,2010; Senlik et al., 2005; Adand et al., 2008; Natal et al., 2009; Ashrafihelan et al.,2010). Science, helminth infection in pigeon affected by food supply, geographic location and climatic conditions, the observed differences in the prevalence of helminths species within the months in present study could be due to the availability and distribution of their intermediate hosts or infective stages of larval nematode (Olsen and Braun, 1980). Pigeons have ability to transmission of some pathogenic agents to both human and birds. *Toxoplasma gondi*, an important zoonotic disease, have been detected in pigeons in some location of the world.
Moreover, various bacterial and viral infections such as *Salmonella*, *Campylobacter* and *Paramyxovirus* can be transferred from these birds to human (Vucemilo et al., 2000). According to roll of pigeons as a risk factor for human and poultry health, more studies are need to investigate parasitic infection of pigeons in other parts of Iran.

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**References**