Gastrointestinal Helminthic Infections of Local Chickens, Kept under the Traditional System in the Isfahan Region, Center of Iran

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ABSTRACT

Indigenous chickens play an essential role in the Iranian economy especially in the rural sector. Juxtaposing the economic factor against the state of the health of the indigenous birds in Iran, more specifically the prevalence of parasitic infectious diseases, this study was conducted to determine the presence and intensity of species of helminthes in the alimentary canals of the local chickens in the Isfahan area, which is centrally located in Iran. For the purpose of this study, 100 local chickens from five different parts of the geographic region of Isfahan were collected randomly, during 2010-2011. The chickens were slaughtered and their gastrointestinal tracts and alimentary canals were examined for the presence of helminthes. The study identified three nematodes, and two cestodes species. No trematodes were found. From the 100 local chickens examined, 81 were infected (81%). The distribution of the presence of species was as follows: Raillietina tetragona (46%), Heterakis gallinarum (42%), Ascaridia galli (36%), Raillietina echinobothrida (7%) and Subulura brumpti (2%). More research is needed to identify all parasites in the region, and to understand the causes of infection, disease and death. Such research will provide the basis for improving the conditions including a reduction of the high mortality rate of local chickens in the area. It is therefore necessary that periodical parasitological investigations as well as anthelmintic treatments should be carried out regularly.

Key Words: Helminthes, Isfahan, local chicken

ÖZET

İRANIN MERKEZİNDE BULUNAN ISFAHAN BÖLGESİNDE GELENEKSEL SİSTEMLE BAKILAN YEREL TAVUKLARDAKİ GASTROİNTESTİNAL HELMİNTİK ENFEKSİYONLAR

Yerli tavuk ıkläri İran ekonomisinde özellikle kursal bölgelerde önemli bir rol oynamaktadır. İran’da yerli kuşların sağlık durumları; daha özel olarak parasitik enfeksiyonel hastalıklara beraber ekonomik faktörlere karşı bu çalışma İran’ın merkezinde yer alan İsfahan’da yerel tavukların sindirim kanalındaki helmint türlerinin varlığının ve şiddetinin belirlenmesi için yapılmıştır. Bu amaçla 2010-2011 yılları arasında İsfahan’ın 5 farklı bölgesinde rastgele 100 adet yerel tavuk toplanmıştır. Tavuklar mezbahada kesildikten sonra alimenter kanal ve gastrointestinal kanalları helmintler açısından değerlendirildi. Çalışmada üç adet nematode, 2 tane sestod türü tespit edildi. Trematod türü ise rastlamadı. İncelen 100 yerel tavukta, 81’i enfekteydi (%81). Türenin dağılımı Raillietina
Indigenous birds play a crucial role in the economy (Mukaratirwa et al., 2001) by providing inexpensive high quality protein in the world in general, and in developing countries in particular (Dube et al., 2010; Mwale and Masika, 2011; Permin and Pedersen, 2002).

The production of indigenous chickens at the rural level, in many parts of the world, is a subsistence activity (Ashenafi and Eshetu, 2004; Mwale and Masika, 2011), the charge of which is usually left to the women of the household (Mwale and Masika, 2011).

The gastrointestinal parasites, particularly the helminthes, are the most common and the most lethal parasites affecting the indigenous birds (Ashenafi and Eshetu, 2004; Mwale and Masika, 2011). It also has been observed that helminthic infections that are present in rural free-range chickens may result in subclinical diseases (Magwisha et al., 2002; Mukaratirwa et al., 2001). It is therefore essential to scrutinize these parasites more closely to minimize the devastating effect they have on the indigenous birds, other birds and human. Identifying the differences in climatic, agro-climatic and geographic conditions of various regions is one way of closer scrutiny (Dube et al., 2010; Magwisha et al., 2002).

Researchers are cognizant that each locality or region has its own unique climatic, agro-climatic, and geographic characteristics that may affect the indigenous birds differently (Junker and Boomker, 2007), therefore, the characteristics of the area or region in which the research is conducted are essential parts of that research. This approach has been applied by many, conducting research on indigenous birds in various parts of the world including those reviewed in this study: Zimbabwe (Dube et al., 2010; Mukaratirwa et al., 2001); South Africa (Junker and Boomker, 2007; Mwale and Masika, 2011); Bangladesh (Islam et al., 2004); Denmark (Permin et al., 1999); USA (Reid and Carmon, 1958); Palestine (Rayyan et al., 2010); Ethiopia (Ashenafi and Eshetu, 2004; Oljira et al., 2012; Shiferaw et al., 2012); Tanzania (Magwisha, et al., 2002; Permin, et al., 1997); Uganda (Senyonga, 1982). In recent years, the Iranian researchers have conducted similar research in several regions of Iran including but not limited to: Urmia (Naem and Eskandar 2005); Share-Kord (Nabavi et al., 2005); Khuzestan (Nabavi et al., 2007), and Golestan Province (Eslami et al., 2009), the latter being more recent and to some extent, similar to the present study.

The purpose of this study was to determine the presence and intensity of species of helminthes in the alimentary canals of the local chickens, kept under the traditional system in the Isfahan area, center of Iran.

Materials and Methods

One hundred chickens were randomly collected from five different parts of Isfahan region, during 2010-2011 to determine the presence and intensity of helminthic infections in local chickens of this geographic region.

The chickens were slaughtered and their gastrointestinal tracts where examined, by using the standard parasitological methods. The alimentary canals were opened longitudinally. The intestine was opened, and the mucosa was scraped and washed under running tap water in a 100-mesh sieve, in order to recover the smaller helminthes. The contents were examined under a stereomicroscope and all the parasites seen were collected. The recovered helminthes were preserved in 70% ethyl alcohol. For identification purposes, nematodes were mounted in drops of lacto-phenol, whereas cestodes were stained by carmine, and both...
were later examined under a light microscope. The helminthes were identified using the characteristics described by (Ruff and Norton, 1997; Soulsby, 1982).

**Statistical analysis**

The prevalence of gastrointestinal helminthic infections in local chickens was determined by dividing the number of parasitically infected chickens by the total number of examined ones and recorded as a percentage. The mean intensity was determined by dividing the total number of recovered worms by the number of parasitically infected chickens.

**Results**

In this study, one cestode, *Raillietina tetragona* caused the highest percentage of infection prevalence (46%), and the other, *Raillietina echinobothrida*, a low percentage (7%). The nematode *Heterakis gallinarum* caused the highest percentage of prevalence of infection (42%) in its own category for this study, and the second highest overall. The second nematode *Ascaridia galli* caused (36%); while the third nematode *Subulura brumpti*, a low (2%), which is the least percentage of all. No trematode was found.

In examining the 100 alimentary tracts of the same number of chickens, it was found that 81 chickens (i.e. 81%) were infected with parasitic helminthes, of which, 24 were infected with cestode (24%) and 30 were infected with nematode (30%) singly. The number of chickens infected with both cestodes and nematodes was 27. These findings are summarized in Table 1.

**Table 1.** Prevalence and intensity of helminthes infection rates in 100 local chickens from Isfahan, center of Iran.

<table>
<thead>
<tr>
<th>Parasite</th>
<th>Infection (%)</th>
<th>Mean Intensity</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Heterakis gallinarum</em></td>
<td>42</td>
<td>18</td>
<td>3-46</td>
</tr>
<tr>
<td><em>Ascaridia galli</em></td>
<td>36</td>
<td>6</td>
<td>4-9</td>
</tr>
<tr>
<td><em>Subulura brumpti</em></td>
<td>2</td>
<td>3</td>
<td>2-5</td>
</tr>
<tr>
<td><em>Raillietina tetragona</em></td>
<td>46</td>
<td>16</td>
<td>11-26</td>
</tr>
<tr>
<td><em>Raillietina echinobothrida</em></td>
<td>7</td>
<td>5</td>
<td>1-12</td>
</tr>
</tbody>
</table>

**Discussion**

Research indicates that the low production of indigenous chickens essentially stems from the exposure of the indigenous chickens to the parasites that cause parasitic diseases; inefficient management, and the scarcity of required supplement feed (Pandey et al., 1993). For instance, research shows that the exposure of indigenous chickens to parasitic cestodes will result in slow growth, enteritis, diarrhea and hemorrhages (Gordon and Jordon, 1982).

The most prevalent nematodes species identified in the present study were *Heterakis gallinarum* (42%) and *Ascaridia galli* (36%). The prevalence of *Heterakis gallinarum* recorded in this study is high, similar to the findings of the several studies conducted on local chickens in: Urmia (Naem and Eskandari, 2005), Shahreh-Kord (Nabaviet et al., 2005), Khuzestan (Nabavi et al., 2007), and Golestan (Eslami et al., 2009), all in Iran, as well as others in Palestine (Rayyan et al., 2010), Bangladesh (Islam et al., 2004), Denmark (Permin et al., 1999), Zimbabwe (Permin et al., 2002), and South Africa (Mwale and Masika, 2011).

Two researchers who studied *Heterakis gallinarum*, suggested that diseases caused by this “cecal worm” are mild (Gordon and Jordon, 1982); however, it can function as a harmful intermediate host in transmitting the parasite *Histomonas meleagridis* that causes Histomoniasis in ground-feeder birds, e.g., indigenous chickens and turkeys (Urquhart et al., 1996).
In this study, the prevalence of Ascaridia galli was also high and in agreement with the results of other researchers (Aini, 1990; Ashenafi and Eshetu, 2004; Nabavi et al., 2005; Nabavi et al., 2007; Naem and Eskandari, 2005; Permin et al., 2002). Ascaridia galli endangers the bird by consuming its food, thus, causing the bird to face depression, slow growth, low appetite, reduced egg production that might be indicative of its intestinal mucosa being damaged (Permin et al., 2006).

The prevalence of Subulura brumpti in this study was 2% which is in line with the study carried out by Ashenafi and Eshetu (2004). The lower prevalence of Subulura brumpti can be attributed to the difference in the distribution and inaccessibility of the intermediate host (Ashenafi and Eshetu, 2004).

The present study identified two cestodes: Raillietina tetragona and Raillietina echinobothrida, which according to Soulsby (1982) are considered to be harmful to chickens. The prevalence of Raillietina tetragona is similar to those reported by Eslami et al. (2009) and Dube et al. (2010).

Researchers suggest that a high prevalence of Raillietina spp. is related to the everyday close-contact between the indigenous chicken and the soil that is the refuge for many contaminated elements including the abundance of easily available intermediate hosts (Ashenafi and Eshetu, 2004; Ssenyonga, 1982).

In the present study researchers found no trematode. This finding is in agreement with reports by Dube et al. (2010), Magwisha et al. (2002), Rayyan et al. (2010). Researchers suggest that the scarcity of trematodes is due to the fact that they require a vast number of hosts, which are not available (Junker and Boomker, 2007). Therefore the parasite dies before it becomes a danger. It is worth noting that trematodes essentially infect wild water-fowl, domesticated duck and gees; but not chickens (Mwale and Masika, 2011).

In the present study, 81 chickens (i.e. 81% of selected chickens) were infected, which is very high. The high rate of parasitic infection in indigenous birds is attributable to a multitude of factors among which the interface of the bird and the soil would be the most damaging.

By observing the daily activities of the indigenous birds, several researchers have identified the birds’ intimate and continuous contact with the earth as a major cause of infections and consequently as an essential reason for the high mortality rate (Ashenafi and Eshetu, 2004; Dube et al., 2010). These birds have the habit of scratching and scavenging almost everything in the field (Mwale and Masika, 2011); constantly moving from place to place every day, inspecting and eating any edible thing (e.g., worm, larva, insects, cow dung, household wastes, and seeds) they find in the soil, which harbors many living organisms including parasites of various kinds (Ashenafi and Eshetu, 2004; Permin et al., 2002).

**Conclusion**

Regardless of the absence of any health care and input whatsoever, village birds supply eggs and meat for household consumption and income generation. The damage inflicted by these parasites in view of the economic importance of rural poultry productions in a country like Iran will undoubtedly be high. It is therefore; absolutely necessary that prevention and control measures with better management system should receive ample attention so as to improve the poultry production of the agricultural sector.

The present study sheds new light on the severity of the prevalence of gastrointestinal helminthic infections of indigenous chickens of Isfahan region that has its own agro-climatic characteristics, and the country of Iran with highly diverse geographic and agro-climatic conditions. More research is needed to identify all parasites in the region and the country, in order to understand the causes of infection, disease and death. Such research will provide the basis for improving conditions including a reduction of the high mortality rate of local chickens in the country. Periodical parasitological investigations as well as anthelmintic treatments should be carried out regularly.
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REFERENCES


