An external and internal parasites survey in local chickens (*Gallus gallus domesticus*) in Wasit Province

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Abstract

This study included the detection of external and internal parasites in local chickens (*Gallus gallus domesticus*) in Wasit province. Seventy-five samples were collected from local markets in governorate for the period between the end of January 2020 and the beginning of April 2021. After examining the chickens, it was found that they were infected with five species of external parasites, with an infection rate of (93.33%). These species included *Goniocotes gallinae* (17.33%), *Goniocotes gigas* (20%), *Lipeurus caponis* (18.66%), *Menocanthus stramineus* (69.33%), and *Menopon gallinae* (45.33%). Ten species of internal parasites included five species of cestodes with infection rate (82.66%) types of cestodes *Rallietina tetragona* (20%), *Cotugina sp.* (14.66%), *Anomotaenia microrhyncha* (10.66%), *Diplogynia sp.* (25.33%), and *Tetracisdiocotyla macroscoleina* (12%), four species of nematodes four species of with a percent of (30.66%), including *Ascaridia galli* (1.33%), *Ascaridia columbae* (24%), *Heterakis gallinaru* (13.33%), and *Capillaria sp.* (1.33%); and one type of protozoa include *Eimeria sp.* (21.33%). This study recorded chicken as the final host of three species of tapeworm (*Anomotaenia microrhyncha*, *Diplogynia sp.* and *Tetracisdiocotyla macroscoleina*) for the first time in Iraq. In this study, statistical analysis showed no significant differences between male and female when infected with ectoparasites and cestodes. As for the infection of nematodes showed founded high significant differences between males and females at the level of probability (P≤0.01) while the infection of protozoa had significant differences at the level of probability (P≤0.05) according to gender.

Keywords: Ectoparasite, Endoparasite, domestic chicken, Cestodes, Nematodes, Lice, Protozoa.

Introduction
Parasitic infection of domestic birds causes a health and economic problem and is a source of infection for many industrial poultry, wild birds and humans (Anshnafi and Shetu, 2004). The economics importance of parasitic worms is highlighted in the extent to which the cause various harms in the infected bird that may lead to their loss (Nnadi and George, 2010). Internal and external parasites that infect hosts include physiological and morphological characteristics such as smaller size, body form, hook and tough body, and the existence of hordes, which add to their adaptation to long life. These organisms are a crucial factor governing the chicken industry by changing the pace of growth in the host, leading to organ failure and death (Alasadiy et al., 2020). Poultry infecting by various types of external parasites, such as ticks, lice and scabies that live on the skin and feathers of chickens permanently or temporarily (White et al., 2009). It also results in increased economic losses when it transports protozoa to poultry, and has a direct effect on their meat and egg production because they feed on chicken blood (Jacquie, 2015). Cestodes, nematodes, and Coccidia are the most prevalent internal parasitic worms in birds (El-Dakhly et al., 2016). The domestic chicken consumes a large variety of foods, this included foods, fruits, and insects that could harbor parasite infective stages, predisposing them to parasite infection, especially gastro-intestinal parasites (Satish and Priti, 2013).

Materials and Methods

The study included collecting 75 domestic chicken *Gallus gallus domesticus* of both sexes (41) male and (34) female from the local markets of the AL-kut city for the period end of December 2020 to the beginning of April 2021. The sample transferred to the parasites laboratory for examination, where the information of each sample (age –gender– weight) recorded. Then the sample were prepared for examination and diagnosis.

Isolation of Ectoparasite

The samples were inspect at the outside with the help of hand lens from different areas of the body (head-legs-under the wings). In addition, by using a scalpel, the lice sample collected and placed in glass tube containing alcohol 70%. Then the samples were prepared for examination where they placed in a solution of potassium hydroxide KOH 10% for a period of five minutes with heating to dissolve the keratin layer and clarification the internal structures (Tylor and Muller, 1971). The sample were loaded on glass slide and using Canada balsam. Then the cover
slide was placed and left to dry to be examined. Samples were send to the Natural History Museum to confirm the classification.

**Isolation of Gastrointestinal parasite**

Birds was slaughtered after transporting them to the laboratory. The birds examined by dissecting the body longitudinally from the abdomen and chest after removing the feathers from them. Macroscopic examined to detect any damage in the internal cavity. The large worms were extracted using scalpels, while the little worms used a thin needle. Samples washed using physiological solution to remove mucus and placed in a glass tube containing alcohol 70% with some drops of glycerin 5% to maintain the suppleness of the samples.

**Fixation and staining of worms**

Nematodes extracted and put in lacto phenol solution to make the worms transparent and placed on slide for preparation to diagnosis (Taylor and Muller, 1971). As for Cestodes Stained using acid Acetocarmín, stain according to Garcia and Ash (1979). Several drops of the stain on the samples by dropper in the petry dish for one hour with constant examination of stained samples until acquiring appropriate stain, removing over pigment by adding add a few drops of hydrochloric acid, then isolate the scolex and rest stained pieces and placed between two glass and tied using rubber bands, The two glass was opened and put in 70% ethanol, and then put it through a series dilution of ethanol (80%-90%-100%) two minutes for each concentration and then transferred to ethanol mixture 100% and xylene(5:5) for two minutes, and then put it in the xylene for 1-3 minutes, then put the pieces on a clean glass slide and fixed on glass slide by Canada balsam.

**Results and Discussion**

The results of this study showed that local chickens (*Gallus gallus domesticus*) in AL-kut city infected with four species parasites include Cestodes, Nematodes, Lice and Protozoa (table 1). The high infection rate observed in lice, which was (93.33 %) follow by cestodes infection (82.66%); Nematodes infection was in the third degree in terms of percentage of infection (30.66%). Finally, the Protozoa infection was calculated as a percentage (21.33%). Statistical
analysis showed that there were high significant differences at the level of probability P≤0.01 between types of parasites.

Table (1): Elucidate the types of parasites and their infection rate.

<table>
<thead>
<tr>
<th>Type of parasites</th>
<th>No. of infected</th>
<th>Total %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cestodes</td>
<td>62</td>
<td>82.66</td>
</tr>
<tr>
<td>Nematodes</td>
<td>23</td>
<td>30.66</td>
</tr>
<tr>
<td>Lice</td>
<td>70</td>
<td>93.33</td>
</tr>
<tr>
<td>Protozoa</td>
<td>16</td>
<td>21.33</td>
</tr>
<tr>
<td>Chi-Square (χ²)</td>
<td>---</td>
<td>51.901  **</td>
</tr>
</tbody>
</table>

** (P≤0.01).

From the results above it was clear that the highest rate of infestation was recorded in lice, and this agreed with a study of Abdullah, (2013) who recorded (90.77%) in domestic chickens in Sulaimani region. The present outcome was identical to that of Al-Zubaidei, (2015) when recorded the lice infection is highest infection rate and then cestodes came in the second stage in percentage then nematodes in Diyala province in domestic chickens. Also agreement with rate of infection with study of Ashenafi and Yimer, (2005) in percent-infected (93.68%) in central Ethiopia in local scavenging chickens. The result of this study disagree with each of Hasan, (2019) when detection of ectoparasites in different birds in Mosul and Al-Waaly and Jasim, (2018) in domestic chickens and Turkey in Al-Diwaniya with percentage (41.3%, 45% respectively) of lice infection.

Identification of parasites

The study included identification fifteen species of parasite in domestic chickens. Five species were reported of lice in this survey with different rates: *Menocanthus stramineus* fig.1 (A) was
the most prevalent species with rate (69.33%), *Menopon gallinae* (45.33%) recorded the second rate of infection fig.1 (B), *Goniocotes gigas* (20%) fig.1(C), *Lipeurus caponis* (18.66%) fig.1 (D), and *Goniocotes gallinae* (17.33%) fig.1(E). Cestodes and Nematodes worms found in examined chickens included five species of Cestodes, which were *Rallietina tetragona* (20%) fig.2 (A), *Cotugina sp.* (14.66%) fig.2 (B), *Anomotaenia microrhyncha* (10.66%) fig.2 (C), *Diplogynia sp.* (25.33%) fig.2 (D), and *Tetracisdiocotyla macroscolecina* (12%) fig.2(E); four species of nematode including *Ascaridia galli* (1.33%) fig.3 (A), *Ascaridia columbae* (13.33%) fig.3(B), *Heterakis gallinaru* (24%) fig.3(C), and *Capillaria spp.* (1.33%) fig.3(D); Finally, one species of protozoa include *Eimeria sp.* (21.33%) fig.3(E).

Figure 1: (A) *Menacanthus stramineus*; (B) *Menopon gallinae*; (C) *Goniocotes gigas*; (D) *Lipeurus caponis*; (E) *Goniocotes gallinae*

Figure 2: (A) *Rallietina tetragona*; (B) immature proglottids of *Cotugina sp.* (10X); (C) *Anomotaenia microrhyncha*; (D) *Diplogynia sp.*; (E) *Tetracisdiocotyla macroscolecina*
From the table (2) shows, the double infection, which recorded the heights percent (66.66%) than other kinds, single infection (17.33%) and triple type (14.66%). This result was similar with the result of Al-Aredhi, (2020) which was observed as the highest percent in double infection (50%) compared to single infection rate (30.55%) and triple infection rate (19.44%) in black partridge birds in Al-Diwaniyah province. Also agreement with Kansal and Singh, (2014) in Meerut when he register highest incidence in double infection (44.82%) and less infected in single and triple infection percent that was (31% , 24.13% respectively) in broiler chicken.

Table (2): Show the numbers and percentages of infection according to states and interfere of parasitic infection.

<table>
<thead>
<tr>
<th>States of infection</th>
<th>NO. of infection</th>
<th>Total %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single</td>
<td>13</td>
<td>17.33</td>
</tr>
<tr>
<td>Double</td>
<td>50</td>
<td>66.66</td>
</tr>
<tr>
<td>Triple</td>
<td>11</td>
<td>14.66</td>
</tr>
<tr>
<td>Total</td>
<td>74</td>
<td>98.66%</td>
</tr>
</tbody>
</table>

Chi-Square ($\chi^2$) --- 39.510 **

** (P≤0.01).
The influence of chicken’s gender to parasite infection

The results of the statistical analysis in this study indicated that there were no significant differences between males and females when infected with external parasites. As for the internal parasites, the result of statistical analysis showed that there were high significant differences between males and females when infected with Nematodes and had significant differences in Protozoa infection (table 3). And this study agreed with results of Al-Aredhi and Al-Mayali, (2019) when they study ectoparasites in migratory aquatic birds and found there were no significant differences between males and females in Al-Delmaj marsh, Iraq. Many research indicated that there are physiological differences between the gender of birds, such as the level of hemoglobin and the volume of cells packed in blood, which affects the resistance to parasitic infections. In addition, male birds contain an increase in the hormone testosterone in the blood, which works to suppress immunity and decrease the production of antibodies, which makes it less resistance to parasitic infection (Jovani 2000). While Fair et al., (2007) mentioned that the difference in infection rate between males and females birds because females have a high percentage of white blood cells in their blood compared to males, and thus are more resistant to parasitic infection

<table>
<thead>
<tr>
<th>Gender</th>
<th>NO. of examined chickens</th>
<th>Cestodes</th>
<th>Nematodes</th>
<th>Lice</th>
<th>Protozoa</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>NO. of infected chickens</td>
<td>Total %</td>
<td>NO. of infected chickens</td>
<td>Total %</td>
</tr>
<tr>
<td>Males</td>
<td>41</td>
<td>34</td>
<td>82.92</td>
<td>9</td>
<td>21.95</td>
</tr>
<tr>
<td>Females</td>
<td>34</td>
<td>28</td>
<td>82.35</td>
<td>14</td>
<td>41.17</td>
</tr>
</tbody>
</table>
Table (3): Elucidate the number and percentage of infected chickens distributed according to gender

<table>
<thead>
<tr>
<th></th>
<th>75</th>
<th>62</th>
<th>82.66</th>
<th>23</th>
<th>30.66</th>
<th>70</th>
<th>93.33</th>
<th>16</th>
<th>21.33</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Chi-Square (χ²)</strong></td>
<td>--</td>
<td>--</td>
<td>0.773</td>
<td>--</td>
<td>7.921</td>
<td>--</td>
<td>2.763</td>
<td>--</td>
<td>5.017</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>NS</td>
<td></td>
<td>**</td>
<td></td>
<td>NS</td>
<td></td>
<td>*</td>
</tr>
</tbody>
</table>

* (P≤0.05), ** (P≤0.01).

**Pathogenic infection of parasite**

Lice are a severe and life-threatening ectoparasite of poultry that transmission pathogenic agents, and causes heavy morbidity, and irritation in the birds, negatively affecting the poultry farm's economic productivity Abdullah et al., (2018). The reasons for the discrepancy in infection rate are due to the different seasons of collection in addition to the difference area between research and another factors. Internal parasites, such as worms and protozoa, are widespread in chickens because they are raised outside and thus affected by infected soil. The presence of intermediary hosts and vectors, such as beetles, ants, and houseflies, in the proximity of chicken breeding places is responsible for parasite infection transmission and persistence Al-lahaibi et al., (2021).

**References**


