Histopathological Study for some infected Pigeons with 
Raillietina spp. in Baghdad
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ABSTRACT

Raillietina spp. is a parasitological agent that cause harmful losses in birds and poultry industries and due to lack of researches on this parasite and its histological effect we design this study.

The present investigation aimed to assess morbidity rate of Raillietina spp. infection in pigeons and birds, beside their histopathological changes in intestine, kidney and liver. Accordingly, 47 pigeons and birds (Columbidae family) were collected from different areas in Baghdad. They included two hunted species of pigeon (Group A: 20 Columba livia and Group B: 20 Streptopelia decaocto) and further seven birds (Group C: Columba livia domestica) were collected from a local Baghdad market.

The total morbidity rate of Raillietina spp. in pigeons was (47) 45%, while they were 30, 50 and 70% in groups A, B and C respectively. Animal in group A showed an increase in number of goblet cells, enlargement of columnar epithelial cell and villi in the intestine, while in kidney and liver there were no significant changes observed. In group B, there were necrosis and sloughing of the endothelial cells of convoluted tubules of kidneys and had hydropic degeneration of the liver in addition to congestion in some cases. In the intestine, there was infiltration of mononuclear cells and increase in the number of the goblet cells. Group C showed hydropic degenerations in the liver tissues in addition to mononuclear cell infiltration in the portal region with scattered necrosis of the hepatocytes and congestion in some cases. In kidneys there were sloughing in the epithelial cells of proximal convoluted tubules, dilatation of glomeruli and dilated distal convoluted tubules, while in the intestine, there was infiltration of mononuclear cells and increase in the number of goblet cells.
INTRODUCTION

In many cases pigeons may carry the infective stages of helminthes (1) as they depend on different sources to get their food like grains, slugs, earthworm and insects (2). Helminthes are implicated in causing morbidity and mortality in domestic pigeons (1, 3). Retarding growth, especially in the young birds, could also be occurred due to the harmful or devastating effects of the helminthes, which also affect the young's health development, while older birds, they could be prone to minor infections (3,4). One of these important helminthe is Raillietina.

Raillietina is a genus of tapeworms belong's to the family Davaineidae, order Cyclophyllidea, that includes helminth parasites of vertebrates, and mostly of birds. Three species infect birds; R. echinobothrida, R. tetragona, and R. cesticillus, which are the most important among wild and domestic birds, but their prevalence showed a regional variation (5). In Iraq the prevalence of R. micracantha in three species of pigeon (Columba livia, Streptopelia decaoto and Columba livia domestica) was 28% in Basrah (6), and 0.22% for R.tetragona, Contugnia Columba and Killigrewia streptopelia in Neniva, Arbil and Dahok (7), while in Baghdad the prevalence of R. tetragona and R.echinobothrida 22%, 12.66% in Columba livia, 13% and 21% in Streptopelia decaoito and 6%, 18% in Columba livia domestica (8). In Iran, reported that 96.4% of pigeons were infected with R. tetragona (9), while in Nigeria the prevalence of R. tetragona, R. echinobothrida, R. cesticillus and R. magninumida in local chicken was 38.5, 42.0, 10.5 and 8.0%, respectively (10). In Zambia, demonstrated that 81.6% of chicken are infected with Raillietina spp., and they were distributed as 62% and 40% for R. tetragona and R. echinobothrida, respectively (11). Chicken in Bangladesh were less infected, and recorded percentages were 16% for R. echinobothrida and 18% for R. tetragona (12). In Jordan prevalence of R. echinobothrida was 65.3% in chicken (13), while in Ethiopia chicken, the recorded percentages for R. tetragona and R. cesticillus are 35.8% and 19.0%, respectively (14).

With respect to their pathological effects, the helminth generally cause no gross pathological damages in well nourished chicken, but they do compete for food when it grow to excessive number. In such cases, severe lesions on the intestinal walls and diarrhoea could arise, which ostensibly resulted in illness. Under heavy infestation, R. echinobothrida listed as one of the most pathogenic tapeworms, causing conspicuous intestinal nodules in chicken, with characteristic hyperplastic enteritis associated with the formation of granuloma. The symptom is termed “nodular tapeworm disease” (15). The poultry intestinal nodules often result in degeneration and necrosis of intestinal villi, accompanied by anaemia with a significant increase of total...
leukocyte count and decrease of total serum protein (15). Based on such brief presentation, due to paucity of information regarding the morbidity rate of these parasites and their histopathological effects in pigeons of Iraq, the present study came to shed light on these profiles.

MATERIALS AND METHODS

Forty seven birds (Columbidae family) were collected from different areas in Baghdad. They included two hunted species of pigeon (Group A: 20 Columba livia and Group B: 20 Streptopelia decaoto) and further seven birds (Group C: Columba livia domestica) that were collected from a local Baghdad market. The birds classified according to (16) and confirm by natural history museum- Baghdad University.

The birds were first sacrificed, and the organs (intestine, kidney and liver) were obtained. The intestine was examined grossly for Raillietina spp (17). After that all obtained organs were fixed in 10% neutral buffered formalin, and then processed to prepare 5 µm tissue sections, which were stained with hematoxylin and eosin, using the standard procedure of histopathological preparation (18). The prepared slides were examined under the power 25x and 40x to diagnosis the histopathological changes in the obtained organs.

RESULTS AND DISCUSSION

Morbidity Rate

The total morbidity rate of Raillietina spp. in pigeons was (47) 45%, and such finding was in a good agreement with the morbidity rate in Bangladesh (40%) and Ethiopia (35.8%) (9,11), but it was higher than the reported rates in Jordan (18%) or Iran which was 27% (10,6). When the morbidity rate was inspected in the three investigated species, it is also showed variation, and it was 71% (7) in Columba livia domestica, 50% (20) in Streptopelia decaoto and 30% (20) in Columba livia (table 1).

Table -1 : Show the morbidity rate in pigeon types.

<table>
<thead>
<tr>
<th>Pigeon species</th>
<th>Number of cases</th>
<th>Morbidity rate %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Columba livia domestica</td>
<td>7</td>
<td>71.4</td>
</tr>
<tr>
<td>Streptopelia decaoto</td>
<td>20</td>
<td>50</td>
</tr>
<tr>
<td>Columba livia</td>
<td>20</td>
<td>30</td>
</tr>
</tbody>
</table>

Gross Changes

There were no gross lesions in the small and large intestine of the infected pigeons, except in some cases congestion was observed in the duodenal. When the kidneys and liver were examined, also no significant changes were observed. Such findings were in contrast with the results of (19), who listed R. echinobothrida as one of the most
pathogenic tapeworms, causing conspicuous intestinal nodules in chicken, with characteristic hyperplastic enteritis associated with the formation of granuloma.

**Histopathological Changes in Group A**

In the intestine, there was an increase in the number of goblet cells, which may be responsible for secretion of mucine. Also, there was enlargement in the columnar epithelial cells and their villi. Additionally, infiltration of mononuclear inflammatory cells was observed (Figure 1). These observation agree with (20) who reported similar pathological lesions in gut of Desi fowls that infected with *R. echinobothrida*, as well as, (21) who showed desquamation of epithelium, congestion, cellular infiltration, hemorrhagic exudates and desquamation of submucosal glands especially in duodenal. The observed pathological changes in the intestines were characterized by villous atrophy, enteritis with cellular infiltration and formation of characteristic granulomas. In contrast, there were no significant changes in the liver and kidneys. Such findings may be interpreted in the ground that the infection did not reach the liver and kidneys because the parasite can not pass to the circulation or may be this type of pigeon is more resistance to this parasite which prevents it to cross outside the intestine.(22)

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**Figure-1:** Intestine section showed increase in the number of goblet cell, enlarged columnar epithelial cells, villi and infiltration of mononuclear inflammatory cells (→) (H & E: 40X).

**Histopathological Changes in Group B**

Tissue sections of kidney revealed that there were a necrosis in tubules, and sloughing of endothelial cell of tubules (Figure 2).
Figure 2: kidney section showing necrosis in tubules and sloughing of endothelial cell of tubules (→) (H & E: 25X).

There was generalized hydropic degeneration in the liver tissue, in addition to congestion in some cases (Figures 3A and B).

Figure 3A: Liver section showing generalized hydropic degeneration (→) (H & E: 25X), and Figure 3B (H & E: 40X).

In the intestine, there was infiltration of mononuclear cells (lymphocytes and macrophages) and there was increase in the number of the goblet cells. There was also a dwarfism of villi (Figure 4). Such findings are in a good agreement with the results of (20, 21) who recorded cellular infiltration and formation of characteristic granulomas in chicken.
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Figure 4: Intestine section showing dwarfism of vilia ( ), infiltration of mononuclear cells ( ). (H & E: 25X).

**Histopathological Changes in Group C**

There were hydropic degenerations in the liver tissue in addition to mononuclear cell infiltration in the portal region with scattered necrosis of hepatocytes. There was also congestion in some cases (Figures 5A and B).

![Liver section showing hydropic degeneration](image-A)

![Mononuclear cell infiltration in the portal region](image-B)

Figure 5: (A) Liver section showing hydropic degeneration. (H & E: 40X). and (B) showing mononuclear cell infiltration in the portal region with scattered necrosis of hepatocytes (H & E: 40X).

In kidney, there was sloughing of proximal convoluted tubules epithelium, dilatation of glomeruli, and dilated of distal convoluted tubules (Figures 6A and B).
Figure 6.: (A) Kidney section showing sloughing of proximal convoluted tubules epithelial (→) and dilatation of glomeruli (→) (H & E: 40X). (B) Kidney section showing dilated of distal convoluted tubules (→) (H & E: 40X).

In the intestine, there was infiltration of mononuclear cells (lymphocytes and macrophages) and there was increase in the number of goblet cells and the parasite was observed in the deep part of the intestine (muscular layer), as shown in figure (7). These observation and others were also reported by (21) who demonstrated that the pathological changes in the intestines were characterized by villous atrophy, enteritis with cellular infiltration and formation of characteristic granulomas, and the same findings were confirmed by (19, 22). The last three groups of investigators listed *R. echinobothrida* as one of the most pathogenic tapeworms, causing conspicuous intestinal nodules in chicken, with characteristic hyperplastic enteritis associated with the formation of granuloma.

Figure 7: Intestine section showing infiltration of mononuclear cells (→) and inlarge of villi (H & E: 40 X)
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Conclusion and Recommendation:
In this study the morbidity rate of Rallietina spp. is 45%, which considered relatively high in Iraq, and such infection caused important histotological changes in intestine, liver and kidney of the investigated birds. Therefore, it is recommended to achieve further studies to record the prevalence of this parasite on migrated birds; and another survey studies applied on other species of birds on all Iraqi governorates.

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