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RESEARCH ARTICLE

# Epidemiology and pathology of intestinal helminthiasis in fowls

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**Özet**

**Paul DR, Dey AR, Bilkis F, Begum N, Mondal MMH.** Kanatlılarda barsak helmintiazisinin patolojisi ve epidemiyolojisi. **Eurasian J Vet Sci, 2012, 28, 1, 31-37**

**Amaç:** Yerli kanatlılarda barsak helmintlerinin patoloji ve epidemiyolojisini belirlemektir.

**Gereç ve Yöntem:** Lokal marketlerden 109 kanatlının visceral organları toplandı. Helmintlerin identifikasyonu cinsiyet, sezon ve yaşa göre yapıldı.

**Bulgular:** Kanatlıların 79 (%72.47)'unda bir veya daha fazla helmint tespit edildi. İki farklı trematod (*Catatropis verrucosa, Echinostoma revolutum*), üç farklı sestod (*Raillietina tetragona, Raillietina echinobothrida, Raillietina cesticillus*) ve iki farklı nematod (*Ascaridia galli, Heterakis gallinarum*) olmak üzere yedi farklı helmint türü idetifiye edildi. Helmint prevalansı erişkin (%78.37) ve erkeklerde (%78.43), genç (%60) ve dişilerden (%67.24) daha yüksek ($p<0.01$) belirlendi. Kanatlıların kuru mevsimlerde (% 79.55) nemli mevsimlere (% 67.97) göre daha duyarlı ($p<0.01$) olduğu belirlendi. Barsakların nekrotik odaklar içermekte, kalın ve yangılı olduğu belirlendi.

**Öneri:** Bangladeş'te, yerli kanatlı üretimini barsak helmintleri ciddi olarak tehdit etmektedir.

**Abstract**

**Paul DR, Dey AR, Bilkis F, Begum N, Mondal MMH.** Epidemiology and pathology of intestinal helminthiasis in fowls. **Eurasian J Vet Sci, 2012, 28, 1, 31-37**

**Aim:** To investigate the epidemiology and pathology of intestinal helminthiasis of indigenous fowls.

**Materials and Methods:** 109 fowl's viscera were collected from local market. Identification of helminths was done according to age, season and sex.

**Results:** Over all 79 (72.47%) fowls were infected with one or more species of helminths. Seven species of helminth including two trematodes (*Catatropis verrucosa, Echinostoma revolutum*), three cestodes (*Raillietina tetragona, Raillietina echinobothrida, Raillietina cesticillus*) and two nematodes (*Ascaridia galli, Heterakis gallinarum*) species were identified. Significantly ($p<0.01$) higher prevalence of helminths were recorded in adults (78.37%) and males (78.43%) than in young (60%) and females (67.24%), respectively. Fowls were 1.85 times more susceptible ($p<0.01$) to helminth infection in dry season (79.55%) than wet season (67.97%). Intestine became thickened and inflamed with presence of necrotic spots.

**Conclusion:** Intestinal helminths are the serious threat to the indigenous fowl production in Bangladesh.

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Keywords: Epidemiology, pathology, fowl, Bangladesh

## ► Introduction

The production of backyard poultry under semi-scavenging system is found suitable to the villagers as additional source of income and nutrient supplement. It can also help generation of both wage and self-employment (Latif 2001). Moreover, the government of this country has given priority to increase scavenging and semi scavenging poultry for poverty alleviation because poor farmers can easily rear some poultry with small financial investment and get benefit by selling meat and egg of poultry (Bangladesh Economic Review 2008). Nevertheless, indigenous poultry production has been adversely affected by a variety of poultry diseases including intestinal helminthiasis caused by nematode, cestode and trematode (Islam et al 2004). Fowls are highly affected by nematode above six months of age. The incidence of gastrointestinal parasitic infection in domestic fowl highest during winter and lowest in summers (Samad and Rahman 1985).

Poultry flock of Bangladesh free from helminth parasites is almost an exceptional example. A perusal of available literature fails to trace any information about the epidemiology and pathology of intestinal helminthiasis of indigenous fowls in Bangladesh under the existing situation. An in depth study regarding epidemiology of intestinal helminthiasis is required to institute control studies. So, the present study is proposed carry out to solve the questions.

Aim of this research was undertaken to determine the prevalence and pathological investigation of intestinal helminths of fowl in Bangladesh.

## ► Materials and Methods

109 fowl's viscera were collected from Market, Bangladesh Agricultural University and Mymensingh, Bangladesh. The research work was conducted from June to November, 2009 which included wet (June to September) and dry (October to November) season. Age, sex and general body conditions of the birds were recorded carefully during collection. Postmortem examination and parasitic identification were done by previously reported methods (Wardle and Mcleod 1952, Yamaguti 1958, Reid 1962, Norton 1964, Skrjabin 1964, Fowler 1990). Trematodes and cestodes were stained with Semichon's carmine (Cable 1967).

During collection of the parasites, small and large intestine found to harbor the parasites were examined carefully for gross pathological changes, if any. For histopathological study, suspected formalin fixed tissue samples were processed, embedded in paraffin wax, cut in appropriate thickness and stained with Hematoxylin and Eosin as per standard methods described by Luna (1968).

Data obtained in the present study were subjected to analysis through descriptive statistics like percentage, range, mean, standard error and chi-square test using SPSS program. Odd ratio was obtained by the formula according to the Schlesselman (1982).

## ► Results

In the present study, a total of 109 fowls were examined of which 79 (72.47%) were positive for one or more different species of helminth (Figures 1-6). Overall prevalence of trematode, cestode and nematode were 5.50%, 41.48% and 72.47%, respectively (Table 1). Prevalence was relatively higher in adult fowls aged ≥ 4 months (78.37%) than in young fowls aged ≤4 months (60%). Adults were 2.42 times more susceptible to helminth infection than young's (Table 2). Prevalence of helminth was higher in male (78.43%) than in female (67.24%). Male fowl were 1.77 times more susceptible to helminth infection than female

*Figure 1. Anterior portion of Echinostoma revolutum*

*Figure 2. Scolex of Raillietina tetragona*

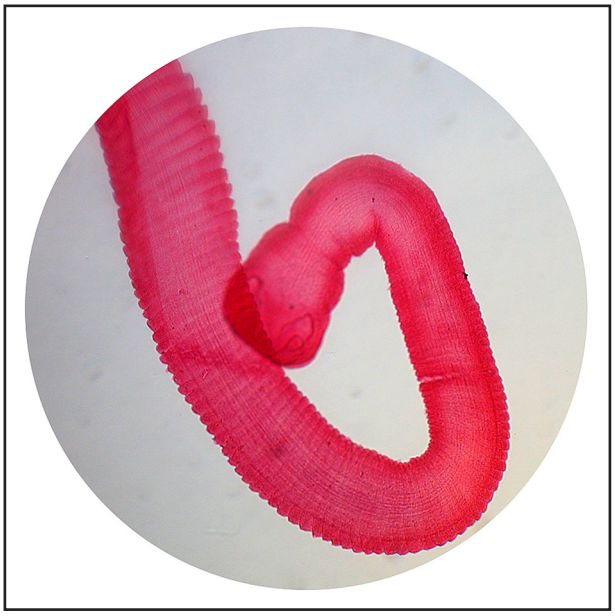

Figure 3. Scolex of Raillietina echinobothrida

Figure 4. Scolex Raillietina cesticillus

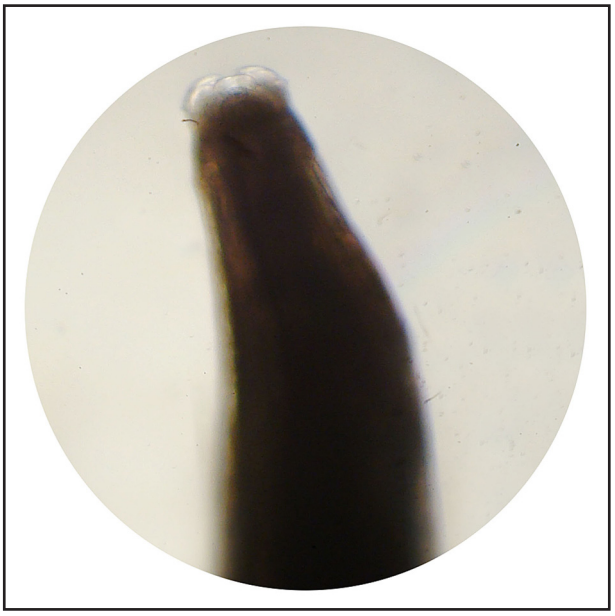

Figure 5. Anterior portion of Ascaridia galli

Figure 6. Anterior portion of Hetarakis gallinarum

(Table 3). In addition, prevalence was higher in dry season (79.55%) than wet season (67.96%, Table 4).

Grossly, intestinal wall was found thickened and inflamed with hemorrhagic necrotic spots. In some cases, small worms were observed in the lumen of the cesium and were associated with marked inflammation, thickening and pinpoint or echimotic hemorrhage in the cecal wall. But there was no microscopic lesion.

## ► Discussion

The prevalence (72.47%) of helminth (Table 1) was lower than those reported from South Africa, Kenya and Ethiopia (Eshetu et al 2001, Mungube et al 2008, Mwale and Masika 2009). Overall prevalence of trematode, cestode and nematode were 5.50%, 41.48% and 72.47%, respectively. However, the experimental results of Mungube et al (2008) from Kenya and Islam et al (2004) from Bangladesh were nematode (74.4%, 77.2%), cestode (68.1%, 58.7%) and trematode (0.0%, 4.6%) respectively. The result from the present and previous study in case of trematode and nematode was more or less similar but differ in case of cestode. The difference might be due to variation in the geographical locations, climatic conditions of the experimental area and methods of study and collection of samples.

Prevalence of helminth (Table 2) was significantly ($p<0.01$) higher in adult (78.37%) than in young's

*Table 1. Overall prevalence of intestinal helminth in indigenous fowls (n: 109).*

| Helminths | Location | Number | Percentage (%) | Helminth burden | |
|---|---|---|---|---|---|
| | | | | Range | Mean±SE |
| Trematode | | | | | |
| *Catatropis verrucosa* | cecal | 6 | 5.50 | 1-10 | 3.12±0.25 |
| *Echinostoma revolutum* | cecal | 4 | 3.66 | 1-2 | 2.24±0.19 |
| Sub-total | | 6 | 5.50 | 1-10 | 2.68±0.22[c] |
| Cestode | | | | | |
| *Raillietina tetragona* | Small intestine | 40 | 36.69 | 1-17 | 4.32±0.85 |
| *Raillietina echinobothrida* | Small intestine | 42 | 38.53 | 1-15 | 3.95±0.77 |
| *Raillietina cesticillus* | Small intestine | 27 | 24.77 | 1-13 | 2.85±0.36 |
| Sub-total | | 45 | 41.28 | 1-17 | 5.56±0.99[a] |
| Nematode | | | | | |
| *Ascaridia galli* | Large intestine | 46 | 42.20 | 1-6 | 2.31±0.11 |
| *Heterakis gallinarum* | Cecal, Rectum | 74 | 67.88 | 1-15 | 3.24±0.26 |
| Sub-total | | 75 | 69.72 | 1-15 | 3.61±0.33[b] |
| Total | | 79* | 72.47 | 1-17 | 3.05±0.23 |

*In the 6th column, figures with same letter or without letter do not differ significantly whereas figures with dissimilar letter differ significantly (as per DMRT). * = Total no. of fowls affected is less than the summation of individual infestation because same fowl was infested by more than one type of helminth.*

*Table 2. Intestinal helminth of fowls in relation to host's age (n: 109).*

| Age | Helminths | Number | Percentage (%) | Helminth burden | | Odds ratio |
|---|---|---|---|---|---|---|
| | | | | Range | Mean±SE | |
| Young (≤4 months), n=35 | Trematode | | | | | Adult vs Young = 2.42 |
| | *Catatropis verrucosa* | 1 | 2.86 | 1-2 | 1.02±0.00 | |
| | Sub-total | 1* | 2.86 | 1-2 | 1.02±0.00[c] | |
| | Cestode | | | | | |
| | *Raillietina tetragona* | 10 | 28.57 | 1-12 | 3.21±0.21 | |
| | *Raillietina echinobothrida* | 12 | 34.28 | 1-10 | 3.10±0.33 | |
| | *Raillietina cesticillus* | 8 | 22.86 | 1-6 | 2.14±0.42 | |
| | Sub-total | 15* | 42.86 | 1-12 | 2.82±0.32[b] | |
| | Nematode | | | | | |
| | *Ascaridia galli* | 17 | 48.57 | 1-5 | 3.12±0.22 | |
| | *Heterakis gallinarum* | 20 | 57.14 | 1-10 | 3.42±0.19 | |
| | Sub-total | 20* | 57.14 | 1-10 | 3.27±0.21[a] | |
| | Total | 21* | 60 | 1-12 | 2.37±0.18 | |
| Adult (≥ 4 months), n=74 | Trematode | | | | | |
| | *Catatropis verrucosa* | 5 | 6.76 | 1-3 | 1.00±0.012 | |
| | *Echinostoma revolutum* | 4 | 5.40 | 1-2 | 1.05±0.015 | |
| | Sub-total | 5* | 6.76 | 1-3 | 1.025±0.013[c] | |
| | Cestode | | | | | |
| | *Raillietina tetragona* | 30 | 40.54 | 1-15 | 3.12±0.13 | |
| | *Raillietina echinobothrida* | 30 | 40.54 | 1-17 | 3.36±0.34 | |
| | *Raillietina cesticillus* | 19 | 25.68 | 1-12 | 3.41±0.28 | |
| | Sub-total | 30* | 40.54 | 1-17 | 3.29±0.25[a] | |
| | Nematode | | | | | |
| | *Ascaridia galli* | 29 | 39.18 | 1-2 | 1.15±0.16 | |
| | *Heterakis gallinarum* | 54 | 72.97 | 1-13 | 3.24±0.32 | |
| | Sub-total | 55* | 74.32 | 1-13 | 2.20±0.24[b] | |
| | Total | 58* | 78.37 | 1-17 | 2.17±0.17 | |
| | P value | | | | 0.0002/** | |

*In the 6th column, figures with same letter or without letter do not differ significantly whereas figures with dissimilar letter differ significantly (as per DMRT), *=Total no. of fowls affected is less than the summation of individual infestation because same fowl was infested by more than one type of helminth, ** = Means p<0.01.*

*Table 3. Intestinal helminth of fowls in relation to host's sex (n: 109).*

| Sex | Helminths | Number | Percentage (%) | Helminth burden | | Odds ratio |
|---|---|---|---|---|---|---|
| | | | | Range | Mean±SE | |
| Male, n=51 | Trematode | | | | | Male vs Female = 1.77 |
| | *Catatropis verrucosa* | 4 | 7.84 | 1-3 | 1.12±0.12 | |
| | *Echinostoma revolutum* | 3 | 5.88 | 1-2 | 1.32±0.22 | |
| | Sub-total | 4* | 7.84 | 1-3 | 1.21±0.17[c] | |
| | Cestode | | | | | |
| | *Raillietina tetragona* | 23 | 45.09 | 1-13 | 3.21±0.51 | |
| | *Raillietina echinobothrida* | 22 | 43.14 | 1-11 | 3.25±0.47 | |
| | *Raillietina cesticillus* | 16 | 31.37 | 1-10 | 3.50±0.43 | |
| | Sub-total | 23* | 45.09 | 1-13 | 3.32±0.46[a] | |
| | Nematode | | | | | |
| | *Ascaridia galli* | 27 | 52.49 | 1-5 | 2.14±0.16 | |
| | *Heterakis gallinarum* | 39 | 76.47 | 1-12 | 2.40±0.31 | |
| | Sub-total | 39* | 76.47 | 1-12 | 2.25±0.24[b] | |
| | Total | 40* | 78.43 | 1-13 | 2.26±0.31 | |
| Female, n=58 | Trematode | | | | | |
| | *Catatropis verrucosa* | 2 | 3.44 | 1-2 | 1.05±0.02 | |
| | *Echinostoma revolutum* | 1 | 1.72 | 1-2 | 1.00±0.01 | |
| | Sub-total | 2* | 3.44 | 1-2 | 1.024±0.01[c] | |
| | Cestode | | | | | |
| | *Raillietina tetragona* | 17 | 33.33 | 1-10 | 3.25±0.39 | |
| | *Raillietina echinobothrida* | 20 | 34.48 | 1-9 | 3.40±0.25 | |
| | *Raillietina cesticillus* | 11 | 18.99 | 1-8 | 3.55±0.37 | |
| | Sub-total | 22* | 37.93 | 1-10 | 3.38±0.35[a] | |
| | Nematode | | | | | |
| | *Ascaridia galli* | 19 | 32.76 | 1-2 | 1.25±0.04 | |
| | *Heterakis gallinarum* | 35 | 60.34 | 1-10 | 2.31±0.18 | |
| | Sub-total | 36* | 62.06 | 1-10 | 1.81±0.01[b] | |
| | Total | 39* | 67.24 | 1-10 | 2.12±0.12 | |
| | P value | | | | 0.000/** | |

*In the 6th column, figures with same letter or without letter do not differ significantly whereas figures with dissimilar letter differ significantly (as per DMRT), *=Total no. of fowls affected is less than the summation of individual infestation because same fowl was infested by more than one type of helminth, ** = Means p<0.01.*

(60%). Schou et al (2007) reported that helminth prevalence was higher in adult than young chickens. He also reported that prevalence of A. galli was lower in adult that in young. Gauly et al (2005) found that highest infection ($p<0.01$) occurred by helminth at an age of 12 or 18 weeks in fowls. The present study confirms this previous study. Higher prevalence of helminth in adult groups of fowls may be due to loss of body resistance in advanced age. Lower prevalence in young fowl may be due to lowest exposure to external environment.

It was observed that sexual dimorphism of hosts plays an important role in the infectivity of helminths in fowl (Table 3). The prevalence of helminth was significantly ($p<0.01$) higher in males (78.43%) than in females (67.24%). The present study confirms the previous study of Mungube et al (2008) who reported male chickens generally exhibited increased odds for the occurrence of parasites than female birds. But, there is little information about the prevalence of helminth between the sexes of the fowls. The exact cause of higher prevalence of helminth in male cannot be explained. But it can be assumed that variation in the collection of sample, methods of study and climatic conditions of the experimental area may be cause.

Season had an effect on the prevalence of helminth infection in fowl (Table 4). Prevalence was higher in dry season (79.55%) than wet season (67.96%). Zaldiver et al (1984) reported the helminth prevalence is higher in dry season than wet season. Buriro et al (1985) also found highest rate of helminth infection during October to December and minimum during July to September. Srivastav (1999) examined the prevalence of cestode infestation was highest during November and lowest in June. The present study confirms the previous studies. In wet season, fowls are mostly confined in their housing system. So, they can not where in contact with the intermediate host

*Table 4. Intestinal helminth of indigenous fowls in relation to seasons of the year (n: 109).*

| Season | Helminths | Number | Percentage (%) | Helminth burden | | Odds ratio |
|---|---|---|---|---|---|---|
| | | | | Range | Mean±SE | |
| Wet season, n=65 | Trematode | | | | | Dry season vs Wet season = 1.85 |
| | *Catatropis verroucosa* | 4 | 6.15 | 1-3 | 1.54±0.02 | |
| | *Echinostoma revolutum* | 3 | 4.61 | 1-2 | 1.36±0.03 | |
| | Sub-total | 4* | 6.15 | 1-3 | 1.45±0.025[b] | |
| | Cestode | | | | | |
| | *Raillietina tetragona* | 23 | 35.38 | 1-12 | 2.70±0.10 | |
| | *Raillietina echinobothrida* | 23 | 35.38 | 1-8 | 3.54±0.14 | |
| | *Raillietina cesticillus* | 15 | 23.08 | 1-9 | 2.39±0.13 | |
| | Sub-total | 25* | 38.46 | 1-12 | 2.88±0.13[a] | |
| | Nematode | | | | | |
| | *Ascaridia galli* | 24 | 36.92 | 1-2 | 1.54±0.02 | |
| | *Heterakis gallinarum* | 42 | 64.62 | 1-12 | 3.25±0.15 | |
| | Sub-total | 43* | 66.15 | 1-12 | 2.40±0.07[ab] | |
| | Total | 44* | 67.69 | 1-12 | 2.33±0.12 | |
| Dry season, n=44 | Trematode | | | | | |
| | *Catatropis verrucosa* | 2 | 4.54 | 1-2 | 1.45±0.06 | |
| | *Echinostoma revolutum* | 1 | 2.27 | 1-2 | 1.00±0.00 | |
| | Sub-total | 2* | 4.54 | 1-2 | 1.23±0.06[bc] | |
| | Cestode | | | | | |
| | *Raillietina tetragona* | 17 | 38.64 | 1-10 | 3.21±0.25 | |
| | *Raillietina echinobothrida* | 19 | 43.18 | 1-12 | 3.54±0.14 | |
| | *Raillietina cesticillus* | 12 | 27.27 | 1-10 | 4.12±0.39 | |
| | Sub-total | 20* | 45.45 | 1-12 | 3.62±0.23[a] | |
| | Nematode | | | | | |
| | *Ascaridia galli* | 22 | 50.00 | 1-2 | 1.02±0.01 | |
| | *Heterakis gallinarum* | 32 | 72.73 | 1-15 | 2.36±0.28 | |
| | Sub-total | 32* | 72.73 | 1-15 | 1.69±0.15[b] | |
| | Total | 35* | 79.55 | 1-15 | 2.39±0.11 | |
| | P value | | | | 0.0036/** | |

*In the 6th column, figures with same letter or without letter do not differ significantly whereas figures with dissimilar letter differ significantly (as per DMRT), * = Total no. of fowls affected is less than the summation of individual infestation because same fowl was infested by more than one type of helminth, ** = Means p<0.01.*

and other source of infection. In dry season, fowls can easily go every where, so they can easily infected by helminths.

These lesions found in the present study were more or less similar to Abdul and Sarker (1976) who observed that the intestinal wall was found inflamed with hemorrhagic necrotic spots and thickened. In some birds, small worms were observed in the lumen of the caecum and were associated with marked inflammation, thickening and small haemorrhage in the caecal wall. In the present study, there was no microscopic lesion. It may be due to the recent infestation by helminth, error in sample collection, method of study.

## ► Conclusions

Epidemiology and pathology of intestinal helminthiasis were studied in indigenous fowls. Only 3 genuses of cestodes and 2 genuses of nematodes were identified but other cestodes and nematodes were not detected. Further studies should be conducted to identify such intestinal helminths. Pathologically, only gross lesion was observed but no microscopic lesion was found. So, further studies should be conducted to know the pathology of intestinal helminthiasis as well as to estimate economic losses per year caused by these parasites so as to justify the authenticity of planning control program.

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