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Prevalence of Gastrointestinal Helminth Parasites of the Domestic fowl (*Gallus-gallus domesticus*) slaughtered in Giwa Market, Giwa Local Government, Area, Kaduna State, Nigeria

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Abstract
The free range management system of raising domestic chickens (*Gallus-gallus domesticus*) especially in the rural areas exposes the birds to diseases when scavenging for food. This research was embarked upon to conduct a survey on the gastrointestinal helminthes that parasitize the intestinal tract of domestic chicken using the floatation method. The gastrointestinal tracts of 200 domestic fowls slaughtered in Giwa market, Giwa Local Government Area Kaduna State were examined for helminth parasites. A total of 163 birds were infected representing 81.5% of the study population. Six helminth parasites were encountered including *Raillietina tetragona* 48 (24.0%), *Raillietina echinobothrida* 22 (11.0%), *Raillietina cesticillus* 7 (3.5%), *Hymenolepis carioca* 79 (39.5%), *Ascaridia galli* 34 (17.0%) and *Heterakis gallinarum* 41(20.5%).
Hymenolepis carioca was the most abundant Cestode parasite while *Heterakis gallinarum* was the most abundant Nematode parasite recovered from the domestic chickens. Seventy nine (39.5%) of the birds had single infection, 68 (34.0%) had double infections, 14 (7.0%) had triple infections and 2(1.0%) harboured four parasites. No single Trematode parasite was recorded. Site preferences by the parasites in the gastrointestinal tract of the birds were small intestine, large intestine and caeca. There was no statistically significant difference ($p<0.05$) in the infection rate between sexes.
Keywords: Prevalence, gastrointestinal parasites, domestic chickens, *Gallus-gallus domesticus*, Giwa Local Government Area, Kaduna State.

1. Introduction

The domestic fowls (*Gallus-gallus domesticus*) are the most numerous than any kind of poultry. They are kept for income generation particularly in the rural areas (Hassouni & Belghyti, 2000). The poultry industry in Nigeria offers the quickest supply of animal protein to man in form of high quality eggs and meat and provides comparatively faster return to investment than cattle, small ruminants or pigs (Matur *et al*., 2010). Their manure is important in maintaining soil fertility and is widely used by farmers. Over the years there has been an increase in attention given to the health care of the birds by poultry farmers.
The greatest impediment to poultry production in Nigeria are diseases (Lawal *et al*., 2001).The domestic fowls are raised traditionally under free-range management system in villages with little or no supplementary feeding and without any veterinary care, thereby exposing them to parasitic infections (Gary & Richard, 2012). Parasitism ranks high among factors that serve as a threat to chickens, the presence of a few parasites do not usually cause a problem. However, large numbers can have a devastating effect on growth, egg production, and over-all health. The concentration of parasite eggs in the chickens has been attributed to limited housing and veterinary care services; the environment plays a major role in determining the severity of the infection. The chickens pick up the parasite eggs directly by ingesting contaminated feed, water, litter or by eating snails, earthworms, millipedes and other insects which can carry the eggs of the parasites. (Gary & Richard, 2012).
Helminth parasites commonly found in chickens includes Nematodes, Cestodes, and Trematodes. The Nematodes are the most important group of helminthes that affect the chickens both in terms of number and extent of damage caused to the gastrointestinal tract of the chickens.
A good knowledge of the parasites of domestic chickens, species composition and predilection site is essential for prompt disease diagnosis and treatment. This study explored the gastrointestinal parasites of the domestic chicken (*Gallus- gallus domesticus*) in Giwa local Government Area, Kaduna State which to the best of our knowledge is being conducted in the area for the first time.

2. Materials and Methods

2.1 Study area
The study was conducted in Giwa Local Government Area, Kaduna State. Giwa has an area of 2,066 km2 and a population of 286, 427. The area has two seasons. The raining season that starts from June to October and the dry season which is from November to March. The inhabitants of the area are mostly farmers that are mostly involved in Backyard poultry farming.

2.2 Collection of samples

The study was conducted between August and October, 2009. The samples were collected once every week on the market day. Gastrointestinal tracts of two hundred locally bred chickens comprising of 100 males and 100 females slaughtered at Giwa market slaughter slabs, Giwa Local Government Area, Kaduna State were collected at random in sample bottles containing 10% formalin and transported to the laboratory for examination.

2.3 Laboratory examination of samples

In the laboratory, the gastrointestinal tracts were separated into different regions: the gizzard, crop, small intestine, large intestine and caecum. Each region was cut open using a dissecting scissors. The floatation method according to Soulsby, (1982) was used in the examination of the faecal samples. All adult worms recovered from each region were preserved in sample bottles containing 10% formalin. The faecal samples were collected; the floatation medium was prepared by dissolving 200g of NaCl and 360g of sucrose in 1000ml of warm distilled water. The procedure was conducted by placing the faecal matter in universal bottle containing 10mls of floatation medium. The mixture was filtered through a double layer of gauze into glass tube, more media was added until a meniscus was formed. A cover slip was placed gently on the tube and allowed to stand on a level surface for at least 10 minutes. The coverslip was carefully removed and placed on a glass slide and examined immediately for parasites eggs under x10 and x 40 objective lens. Identification was done at the Department of Veterinary Parasitology and Entomology, Ahmadu Bello University, Zaria, Nigeria.

2.4 Data analysis

Chi-square and student-T-tests were used in analysis of the results and level of significance was set at $p<.0.05$.

3 Results

Out of 200 domestic chickens that were examined, 163(81.5%) were infected by six species of gastrointestinal helminth parasites, which comprised four Cestodes and two Nematodes. The Cestode parasites recovered in the chickens were Raillietina *tetragona* 48(24%), *Raillietina echinobothrida* 22(11.0%), *Raillietina cesticillus* 7(3.5%) and *Hymenolepis carioca* 79(39.5%) which was the most abundant Cestode parasite recovered in the gastrointestinal tract of the chickens. The Nematode parasites included *Ascaridia galli* 34(17.0%) and *Heterakis gallinarum* 41(20.5%) which was the most abundant nematode parasite recovered (Table 1). The predilection sites of the parasites in the gastrointestinal tract of the domestic chicken showed that most parasites were found in the small intestine, a few in the large intestine, only *Heterakis gallinarum* was found in the caecum and no single parasite was recovered in the crop and gizzard of the host (Table 1).

The frequency of occurrence of the parasites showed that 39.5% of the chickens had single parasitic infection, 34.0% had mixed infection and harbored two parasites, 7.0% had three parasitic infections, 1.0% had four parasitic infections while 18. 5% of the chickens were uninfected (Table 2). The prevalence of those with two, three and four parasitic infections were significantly different ($P<0.05$).

The sex-specific prevalence of the helminth parasites showed that both male and female chickens had the four species of cestodes and two species of nematode parasites, but there were no significant differences ($P< 0.05$) in infection by all the parasites in both sexes. The t-test showed lack of significant difference ($p> 0.05$) in the prevalence of infection between male and female domestic chickens (Table 3). No single Trematode was recorded in this study.

Table 1: Overall prevalence of helminth parasites in the gastrointestinal tract of domestic chicken (*Gallus-gallus domesticus*) slaughtered in Giwa Local government, Kaduna State (n=200)

Parasite species	Number infected	Prevalence (%)	Predilection sites
Cestodes			
Raillietina tetragona	48	24.0	Small and large intestine
Raillietina echinobothrida	22	11.0	Small and large intestine
Raillietina cesticillus	07	3.5	Small and large intestine
Hymenolepis carioca	79	39.5	Small and large intestine
Nematodes			
Ascaridia galli	34	17.0	Small and large intestine
Heterakis gallinarum	41	20.5	caecum

Table 2: Frequency of occurence of helminth parasites in the gastrointestinal tract of domestic chicken (*Gallus-gallus domesticus*) slaughtered in Giwa Local government, Kaduna State (n=200)

Parasite species	Frequency of occurrence	Percentage
No infection	37	18.5
Single infection		
Raillietina tetragona	12	
Raillietina echinobothrida	10	
Raillietina cesticillus	3	
Hymenolepis carioca	39	
Ascaridia galli	8	
Heterakis gallinarum	7	
Subtotal	79	39.5
Mixed parasite infection (two parasites)		
Hymenolepis carioca+ Raillietina tetragona	19	
Ascaridia galli+ Heterakis gallinarum	13	
Heterakis gallinarum + Hymenolepis	9	
Ascaridia galli +Raillietina tetragona	4	
Raillietina tetragona + Heterakis gallinarum	6	
Ascaridia galli +Hymenolepis carioca	6	
Raillietina tetragona + Raillietina echinobothrida	2	
Raillietina echinobothrida +Ascaridia galli	2	
Hymenolepis carioca +Raillietina echinobothrida	1	
Raillietina echinobothrida +Raillietina cesticillus	3	
Raillietina echinobothrida + Heterakis gallinarum	3	
Subtotal	68	34.0
Three parasites		
Ascaridia galli + Raillietina tetragona + Heterakis gallinnarum	6	
Ascaridia galli + Raillietina tetragona + Hymenolepis carioca	2	
Raillietina echinobothrida + Raillietina tetragona + Heterakis gallinarum	2	
Raillietina tetragona + Hymenolepis carioca + Heterakis gallinarim	2	
Hymenolepis carioca + Raillietina echinobothrida + Heterakis gallinarum	2	7.0
Subtotal	14	

Four parasites		
Hymenolepis carioca +Raillietina tetragona + Raillietina cesticillus +Heterakis gallinarum	2	1.0
Subtotal	2	81.5
Total number of chickens infected	163	100
Grand total	200	

Table 3: Sex- specific prevalence of helminth parasites in the gastrointestinal tract of domestic chicken (*Gallus-gallus domesticus*) slaughtered in Giwa Local government, Kaduna State

Parasite species	**MALES (n=100)**		**FEMALES (n=100)**	
	No. infected	**Prevalence (%)**	**No. infected**	**Prevalence (%)**
Raillietina tetragona	24	24.0	24	24.0
Raillietina echinobothrida	11	11.0	11	11.0
Raillietina cesticillus	05	5.0	02	2.0
Hymenolepis carioca	39	39.0	40	40.0
Ascaridia galli	19	19.0	15	15.0
Heterakis gallinarum	22	22.0	19	19.0

4 Discussion

The study revealed that cestodes and nematode parasites were recovered in the domestic chickens. This outcome might be an indication of higher availability of infective stages of the worms in the study area and the ability of the infective stage of the worms to survive outside the host for a long time before it is picked by the host. Another reason for the high prevalence could be especially due to the inability of the farmers to feed the chickens with grains in the morning before they go out for grazing which exposes the chickens to feed on insects, mites, worms which may be carriers of the infective stage of the parasites which has been shown to increase susceptibility to parasitism. The outcome of this study is in accordance with the work of Yoriyo *et al*., (2008) in which cestodes and Nematodes were implicated as the major cause of helminth infection in domestic chicken.

The prevalence of 81.5% recorded in this study was slightly lower than 87.8% recorded by Yoriyo *et al* (2008) in Bauchi, and 96.3% in eastern Nigeria by Fakae and Nwalusi, (2000). A feature of this study showed a complete absence of trematodes which agrees with several studies by Fabiyi (1972) in Bauchi, Gadzama and Strivastava (1986) in Borno State , Oyeka (1989) in Anambra State, Fatihu *et al*., (1991) in Zaria, Kaduna State, Luka and Ndams, (2007) in Zaria, Kaduna State and Yoriyo *et al*., (2008) in Bauchi.

The predilection sites of all the parasites except *Heterakis gallinarum* were the small and large intestine. More parasites were recovered from the small intestine where there is abundance of semi digested food and debris which favours the establishment of the parasites (Oniye *et al*., 2010). *Heterakis gallinarum* species were recovered in the caecum. This parasite is non- pathogenic in chickens but can serve as a vector for *Histomonas meleagridis*, a protozoan parasite that affects Turkeys, chickens and other birds (Pinckney *et al*., 2008). The prevalence of *Heterakis gallinarum* in the current study was 47 (37.9%). *Heterakis gallinarum* has a major effect on the health of chicken by sharing feed, thereby resulting in stunted growth and low productivity which may be related to damage to the intestinal mucosa (Permin *et al*., 2002). Sometimes the parasite causes major irritation and inflammation to the mucosa of the chicken thus interfering with the absorption of food, it also affects the caecum by causing marked inflammation and thickening of the mucosa with petechial hemorrhages. In addition to that, *H. gallinarum* may produce nodular diarrhea, emaciation and death (Soulsby, 1982). *Reillietina*

tetragona is one of the largest worms transmitted by scavenging birds through the ingestion of ants thereby causing weight loss in the chicken. *Ascaridia galli* is a large round worm that affects young birds more severely. Mild infections may go unnoticed but large numbers of worms may interfere with feed absorption thereby leading to poor growth of the chicken (Smyth, 1976).

The Mixed infection of two or more species of parasites per bird was very common in the present study. This might be attributed to food preference at a particular time which determines the establishment of mixed or single infection in the chicken (Kennedy 1975; Smyth, 1976).

Mixed infections in rural free- ranging chickens have been reported in several studies (Luka & Ndams, 2007; Yoriyo *et al*., 2008; Ohaeri & Okwum, 2013). In this study, majority of chickens harbored multiple species infections which suggests that the environmental conditions

due to poor sanitary conditions in Giwa are favourable to the spread of the infections and heavy worm burdens may lead to weakness thereby making the chicken to be exposed to viral and bacterial infections that may lead to high mortality, low egg production and stunted growth (Heyradin *et al*., 2012).

The adult worms lay many eggs daily which can retain their viability for as long as 12 months and so domestic fowls are constantly picking up viable eggs from the droppings that contaminate the environment as they feed thereby predisposing them for heavy parasite burden (Permin and Hansen, 1998).

Most of the parasites recovered in this study were restricted to the small intestine, particularly the duodenum where there is optimum concentration of saline and glucose (Fatihu *et al*., 1991). Previous studies have shown that the preference for the small intestine by these parasites is to complement their physiological osmotic feeding nature where nutrients exist in dissolved form. The differences in the worm burden could be attributed to climate difference, availability of intermediate host, and possibly host factors such as host immunity.

In this study, no significant difference ($p>0.05$) was observed in parasitic infection based on number of species and prevalence of each species in males and female chickens.

In conclusion, the result indicated that there was no significant difference in prevalence between Nematode and Cestode parasites among the chickens. In the current study area, sex had no significant influence on the prevalence of the helminthes in the chickens. This study indicated that Cestodes and Nematode are highly significant helminth problems of local free range chicken in the study area and therefore measures should be taken to control these helminth parasites by educating the farmers on the impact of the disease, conditions that increase the prevalence of the disease in a locality with the aim of educating them on prevention and control methods by regular deworming of the chickens with improved management system.

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