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Detection of Gastro-Intestinal Helminthes in Local Chicken (*Gallus gallus*) Sold at Sharada Market, Kano Metropolis, Nigeria

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Abstract

Fifty gastrointestinal tracts of local breed chickens slaughtered at Sharada market slaughter slabs Kano State were collected and examined for helminth parasites, formol ether concentration technique was used to concentrate the gut and analysis carried out. A total of 95 parasites belonging to five species were isolated and identified. Of these parasite, *Railleitina tetragona* was found to be the most prevalent (22%) among the chicken breeds, followed by *R. echinobothrida* (18%), *R. cesticillus* (12%), the least were *Ascaridia galli* and *Hetarakis gallinarum* (10%) each. Statistically, there was significant difference ($p \leq 0.05$) in prevalence rate of infection between number of chickens infected and number examined. Parasite preference to sex was also recorded, males harbored more parasites than females. It is recommended that slaughtered chickens should be well cooked to avoid zoonotic infections.

Key words*:* Gastrointestinal tracts, helminthes, local breed chickens, parasite, prevalence

Introduction

The chicken, *Gallus gallus* is believed to have descended from the wild Indian and South East Asian red jungle fowl (Permin and Ranvig, 2001). The bird provides man with high nutritional value and other socio-economic benefits which cannot be overemphasized (Martur, 2000). Besides providing employment and income for small-scale farmers particularly in the off cropping season, poultry integrates very well into other farming activities like cropping and fish farming (Aini *et al*., 1990).

A lot of losses in poultry have been linked to disease causing agents such as viruses, bacteria and parasites. It has been estimated that more than 750 million chickens, guinea fowls and duckling in Africa die each year as a result of various infections (Sonaiya, 1990). Although, somewhat reduction in birds' parasitic infection has been achieved in commercial production system mostly due to improved housing, hygiene and management practices, the prevalence of gastrointestinal parasites is still very rampant (Pandey *et al*, 1992). The domestic chicken feeds on a wide range of food substances, these range from grains, fruits to insect which may harbor infective stage of parasites thereby predisposing them to parasites infection particularly gastrointestinal parasites (Oniye *et al*., 2001). Helminth parasites of chickens are prevalent in many part of the world. In Nigeria documented evidence abound from Anambra State (Oyeka, 1989), Plateau State (Fabiyi, 1972; Pam *et al*., 1992) and Kaduna State (Oniye *et al*., 2001).

Scavenging is important nutritionally but exposes chicken to parasites. Free-range chickens have been found to be severely infected with helminths (especially nematodes and cestodes) (Moya *et al*., 1979; Amin-Babjee *et al.*, 1997; Magwisha *et al*., 2002). Infections occur after ingestion of helminth eggs or intermediate hosts, like cockroaches, grasshoppers, ants, and earthworms (Soulsby, 1982). Helminth infections cause reductions in food intake, injury to the intestinal wall and haemorrhage – resulting in poor weight gain by the host (Ackert and Herrick, 1928; Ikeme, 1971).

The term *helminth* is derived from the Greek words *helmins* or *helminthos* meaning 'worms'. Helminth parasites of poultry are restricted to members of the phyla Platyhelminthes, Nematoda, and Acanthocephala (Smyth, 1994). Nematode forms the dominant group of helminth parasites of poultry in terms of number of species and the extent damage they cause. Cestode of significant importance is of two genera *Railleitina* and *Hymenolepsis* (Oniye *et al*., 2001). Trematode infections are not very common in domestic chickens (Hodasi, 1972). Helminth parasites have been a major cause of ill-health and loss of chicken productivity in different parts of Nigeria (Pam *et al*., 1992). This research will focus on detection of gastro-intestinal helminthes in local chicken (G*allus gallus*) sold at Sharada market, Kano metropolis.

Materials and Method

Study Area and Sampling Site

The natural vegetation in Kano is typically savannah and is composed of shrubs, herbs, grasses and sparsely distributed trees. Kano experiences two seasons, the wet/raining season (April to October) and dry season (November to March) (Olofin, 1987).

The sampling site is the Sharada market slaughter slabs, which is a multipurpose market located off BUK Road, behind Youth Recreation Centre, Kano state metropolis.

Collection of Samples

The study was conducted between October and November, 2015. The samples were collected once every week. Gastrointestinal tracts of fifty locally bred chickens comprising of 25 males and 25 females slaughtered at Sharada market slabs, the samples were collected randomly in labeled sample bottles containing 10% formalin and transported to the laboratory for examination.

Macroscopic Examination of Samples

The gut samples collected from the slaughtered chickens were examined for the presence of helminthes. The intestinal tracts of the male chickens were separated from the female ones, in order to determine the difference in worm infection between the two sexes. The gastrointestinal tracts were separated into small intestine (ileum and duodenum) large intestine and caecum. Each alimentary tract was spread on a dissecting board and the content was scrapped into Petri dishes containing 0.9% physiological saline.

The lumen of each section was opened longitudinally to expose its content as described by Oniye *et al*. (2001). The content was then observed under a binocular microscope for helminthes. Counting of the collected worms was done with the aid of a pair of thumb forceps and morphological appearance of the parasite aided the separation into tape worms (cestodes) and round worms (Nematode) following the protocol of Khalil *et al.* (1994). The compound microscope (Olympus binocular) was used for identification and counting at low magnification. Worms from each section were isolated, counted and preserved in labeled cap bottles containing 10% formalin prior to identification.

Microscopic Examination of Samples

The floatation method according to Soulsby (1982) was used in the examination of the eggs; normal saline was used as a floatation medium. The procedure was conducted by placing the intestinal contents in universal bottle containing 10mls of floatation medium. The mixture was filtered through double layer gauze into test tube, more medium was added until meniscus was formed. A cover slip was placed gently on the test tube and allowed to stand on a test tube stand for 10 minutes. The cover slip was then carefully removed and placed on a glass slide and examined immediately for parasite eggs under ×10 and ×40 objective lens.

Statistical Analysis

The result obtained was analyzed using chi square test, prevalence was calculated as described by Margolis *et al.*

(1982) and expressed as a percentage (%) at $p \leq 0.05$. likewise Shannon-Weiner Index (H´) was computed in order to establish species distribution and diversity in the predilection sites by using the following formula (Shannon and Weaver, 1949; Maiti, 2004):

$$H' = \sum PilnPi$$

Where: Pi= proportion of ith species, ln= natural logarithm.

Results

Out of the fifty (50) gastrointestinal tracts of chickens examined 36 (72%) harboured intestinal helminthes (Table 1). Ninety five (95) parasites belonging to five different species were isolated and identified. Two of the species were nematodes while the remaining three species belongs to cestodes. The results revealed that *Railleitina tetragona*, *Railleitina echinobothrida*, *Railleitina cesticillus*, had the highest prevalence rate in both male and female chicken. There was significant difference between number of chickens examined and infected ($p \leq 0.05$).

Highest prevalence of infection 11 (30.6%) was obtained from *R. tetragona* with *A. galli* and *H. gallinarum* having the lowest prevalence of 5 (10%) each. The predilection site of the parasites in the gastrointestinal tract of the domestic chicken shows that most parasite were found in the small intestine, a few in the large intestine and only *H. gallinarum* was found in the caecum and no single parasite was recovered in crop and gizzard of the host (Table 2).

Parasite preference in relation to species was also observed. It can be deduced from (Figure 1) that cestodes are more prevalent than Nematodes with prevalence of 72.3% and 27.8% respectively. Male chickens had higher prevalence than females (Figure 2) with prevalence of 61.1% and 38.9% respectively. More cestodes were recovered than nematodes, and the highest intensities occurred with *R. tetragona*, ranging from 1-4 worms per host. The result of Shannon-Weiner Index (Table 3) shows uneven distribution of the helminth species at the predilection sites thus, indicating separate *niches* of the species.

Discussion

The study revealed that cestode and nematode parasites were recovered in the sampled domestic chickens. This outcome might be an indication of higher availability of infective stage 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. 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 cause of helminth infection in domestic chicken.

The prevalence of 72% recorded in this study was found to be lower than 87.8% recorded by Yoriyo *et al.* (2008) in Bauchi, and 96.3% in Eastern Nigeria by Fakae and Paul-Abiade (2003). Moreover, Similar work was reported by Abdelqader *et al*. (2008) in Northern Jordan.

The prominent feature of this study was the complete absence of trematode, this is in conformity with the work of Fabiyi (1972) in Bauchi, Gadzama and Strivastava (1986) in Borno state, Oyeka (1989) in Anambra state, Oniye *et al.* (2001) and Lawal *et* al. (2001) in Zaria, Kaduna state, Luka and Ndams, (2007) who similarly found no trematode infection among chickens in different part of Nigeria. The absence of these worms appeared to be linked with their complex life cycle requiring at least an intermediate host which is aquatic, this helps to break the life cycle were water is not available and hence reducing the spread of the worm.

There was a higher prevalence and intensity of cestodes in this study. This concurs with the studies of Oniye *et al.* (2001), Gadzama *et al*.,(1986), and Yoriyo *et al.* (2008). The cestodes *Railleitina* spp, which were dominant parasites in this study are known to be cosmopolitan and contribute to nutrient depletion in birds (Soulsby, 1982), their intermediate hosts, which are ants and beetles are available and more abundant in the area and may form an important part of the diet of chicken in the area. It is safe to assume that the birds might have acquired the helminth infections from their diets.

The lower prevalence in female birds in this study could be due to the fact that female birds reduce their feeding habits during the hatching period and concentrate more on grains and food remnant being serve to them during that period. Most farmers take care of the incubating birds by giving them food and water to compensate for the time spent in incubatory (Yoriyo, 2005). This reduces the chances of picking infection, the males go far in search of food, as a result increase in infection with those species of helminthes parasite that require intermediate hosts occurs (Smyth, 1994; Collier *et al*., 1998; Dube *et al*., 2010).

Conclusion and Recommendation

In conclusion the prevalence of intestinal heliminths infection in chickens was found to be 72 %. This study indicated that nematodes and cestodes are highly significant helminth problems of local chickens in the study area, cestodes are the most common helminthes of chickens *R. tetragona* was the most prevalent parasite affecting chickens in the study area, the prevalence of the parasites is higher in males than in females.

Several studies have identified handling of raw or eating improperly cooked poultry meat as major risk factors for acquiring such parasites in human (Levesque *et al*., 2013; Mughini Gras *et al*., 2012; Strachan *et al*., 2013). It is therefore recommended that further studies on human gastrointestinal parasites around the study area be carried out to ascertain the possible prevalence of the parasites in humans due to the consumption of domestic chickens and seasonal investigation of parasitic infections among the local chickens. Also the impact of natural helminth infections and supplementary protein on growth performance of free-range chickens should be investigated.

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Table 1: Overall Prevalence of Helminthes Parasite in the Gastro Intestinal Tract of Chickens Slaughtered at Sharada Market, Kano Metropolis.

Number of week	No. of chickens examined	No. of chickens infected	Total No. of worms recovered	Prevalence (%)	Intensity of infection
1	10	10	36	100	3.6
2	10	9	18	90	2
3	10	7	17	70	2.4
4	10	6	12	60	2
5	10	4	12	40	3
Total	50	36	95	72	13

There was significant difference between Number of chickens examined and infected at $P \leq 0.05$ ($X^2 = 6.20$).

Table 2: Prevalence and Predilection Site of Intestinal Helminthes of Chickens

Parasite species	No. of chickens infected	Predilection Site			Prevalence (%)
		Small intestine	Large intestine	Caecum	
CESTODES					
Railleitina tetragona	11	8	3	_____	30.6
Railleitina echinobothrida	9	4	5	_____	25
Railleitina cesticillus	6	4	2	_____	16.7
NEMATODES					
Ascaridia galli	5	5	_____	_____	13.9
Hetarakis gallinarum	5	_____	_____	5	13.9
Total	36	21	10	5	72

Table 3: Shannon-Weiner Index (H´) of Distribution of Helminth Parasites according to Predilections sites.

	Predilection site			Total
	Small intestine	Large intestine	Caecum	
No. of species	21	10	5	36
Pi	0.5833	0.2778	0.139	
lnPi	-0.539	-1.281	-1.973	
PilnPi	-0.314	-0.356	-0.274	0.944
Evenness				**1.059**

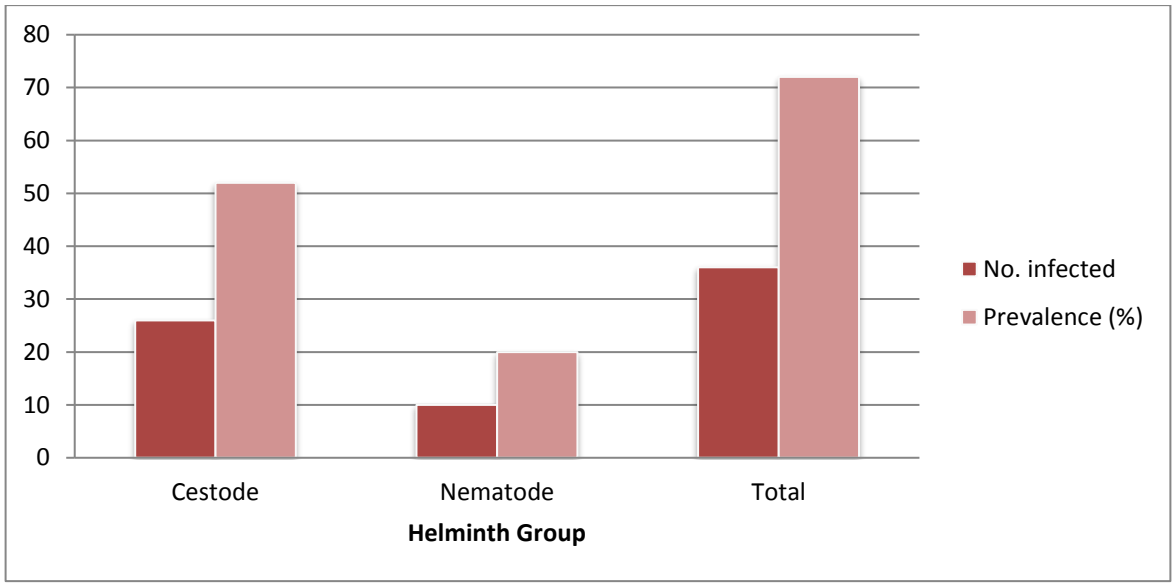

Figure 1: Abundance and Prevalence of Parasitic Helminths Groups in Chickens Sampled at Sharada Market

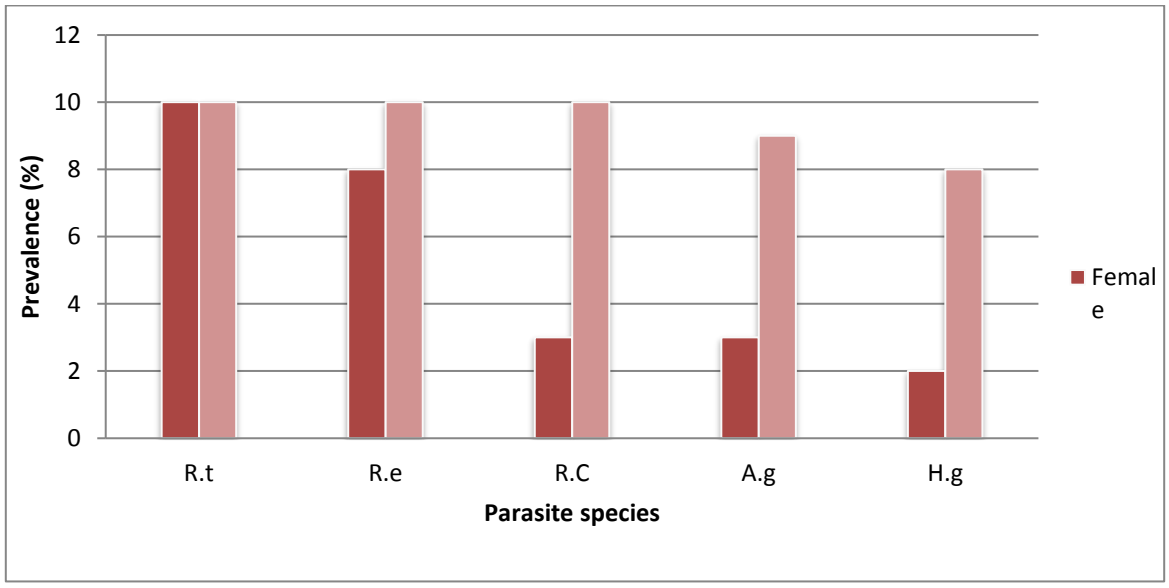

Figure 2: Prevalence and distribution of parasite (Males and Female) of chickens in sharada market.

Key:
R.t- *Ralleitina tetragona*
R.e- *Raillectina echnobothrida*
R.c- *Railleitina cesticillus*
A.g *Ascaridra galli*
H.g *Hetarakis gallinarum*