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The Prevalence of Gastrointestinal Parasites of Guinea Fowl (*Numida Meleagris Galeata*) Slaughtered in Kaduna Metropolis, Kaduna State, Nigeria

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ABSTRACT

The study was conducted to determine the prevalence of gastrointestinal parasites of guinea fowl (Numida meleagris galeata) slaughtered in Kaduna metropolis, Kaduna State, Nigeria. A total of 200 adult Guinea fowls were sampled. The entire gastrointestinal tracts were collected. While simple flotation technique was used to collect helminth eggs in the faeces for identification. The endoparasites recovered from the gastrointestinal tracts were properly examined. Of the 200 guinea fowls examined, a total or 168 (84 %) were infected with helminth parasites. A total of 9 helminths were recovered from the infected Guinea fowls – 4 nematodes and 5 cestodes. The nematodes were Ascaridia numidae, Subulura brumpti, Heterakis numidaenarum and Syngamus trachea with prevalence of 57 % (114), 24 % (48), 10 % (20) and 10 % (20), respectively. Raillietina tetragona, R. echinobothrida, R. cesticillus, R. magninumida and Hymenolepis carioca were the cestodes identified with prevalence of 58 % (116), 33 % (66), 2.5 % (5), 0.5 % (1) and 0.5 % (1) respectively. 140 (70 %) of the guinea fowls shed helminth eggs in their faeces. The helminth eggs and oocysts recovered belongs to Ascaridia, Capillaria, Syngamus, Heterakis, Raillietina, Strongyle and Eimeria with a percentage prevalence of 55 % (110), 36 % (72), 29 % 58), 8.5 % (17), 7 % (14) and 0.5 % (1), respectively. Majority of the Guinea fowls slaughtered within Kaduna metropolis had high prevalence of gastrointestinal (cestodes and nematodes) which is a very serious problem to the guinea fowl population. It may be due to the absence of good management practices and hygienic conditions which when properly harnessed can control this menace in the Guinea fowl population in Kaduna metropolis.

***Keywords**:* Prevalence, Gastrointestinal, Tracts, Parasite, Helminths, Guinea Fowl**.**

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INTRODUCTION

About 20 billion poultry exist worldwide, and of this, 75% are in developing countries, [1]. The World Bank has estimated that it will be necessary to increase meat production by about 80 percent between 2000 and 2030 [2]. Poultry production is an important means of providing high-quality protein for human consumption; as it is the second most widely consumed meat product in the world [3]. Poultry production thus represents a significant portion of the economy as a source of income for small and large holder farmers. They are not only important in narrowing the gap between the demand and supply of the proteins of animal origin but also provide an efficient means of income generation in small scale. The poultry industry was now recognized as an important sub sector of Agriculture [4-6]. When agro-economical issues and the demographics of the human population are considered, village poultry often ranks highly in terms of being an existing resource whose productivity can be increased with only a modest input [7].

In most African countries, backyard poultry accounts for more than 60% of the Total National Flock (TNF), with an asset value of more than 5.75 billion US Dollars [8]. The Guinea-fowl (*Numida meleagris galeata,* Pallas), is a common indigeneous bird on the African continent. In Nigeria, it has a population of 54.7 million and ranks second in the poultry sector, comparing favourably with domestic chicken for meat and egg production [9]. In the Northern Savannah areas of the country, it is found both in the wild and backyards where it is domesticated for meat and eggs by peasant farmers [10, 11, and 12] and as a source of income [13].

In sub-Saharan Africa, there are several species of poultry [14, 6] mainly represented by domestic indigenous chicken (*Gallus gallus domesticus*), guinea fowl (*Numida meleagris*), duck (*Cairina sp*.) and turkey (*Meleagris gallopavo*); their distribution varies from one region to the other depending on both the physical and social environment [14].

In the last decade, the poultry industry especially chicken production has experienced a dramatic expansion. These expansions have been accompanied by the introduction of new management techniques and a large increase in the population of birds [15]. However, a high percentage of birds are local village flocks and compose mainly chicken, guinea fowls, turkeys and ducks. These flocks are managed on free range and their sources of water are mainly stagnant waters like dug out pools, ponds and wells [15].

Guinea fowl thrives well under semi-intensive conditions, forages well, and requires little attention. It retains many of its wild ancestors' characteristics: it grows, reproduces, and yields well in both cold and hot conditions. Compared to chickens, guinea fowls are economically more suitable to tropical regions because of their adaptation to traditional breeding [16]. The guinea fowl potential to increase meat and egg production among low-income countries should therefore be given greater attention [17]. However, several factors, especially those of disease, particularly of parasitic origin limit production, resulting in losses due to mortality and morbidity [18, 13, 19].

The vulnerability of Guinea fowl to parasitic infection could be attributed to its feeding on a wide range of diets due to poor husbandry, and abundance of beetles, cockroaches and earthworms that could serve as intermediate hosts, predisposing them to parasitic infections [19, 20].

Multiple or mixed helminth infection has been reported as being most common in poultry kept extensively [8, 21]. Helminthes are known to compete with the infected hosts, lowering their productivity and in severe cases, causing death by blocking the gastrointestinal tract (G.I.T) especially when the worm burden is high [22].

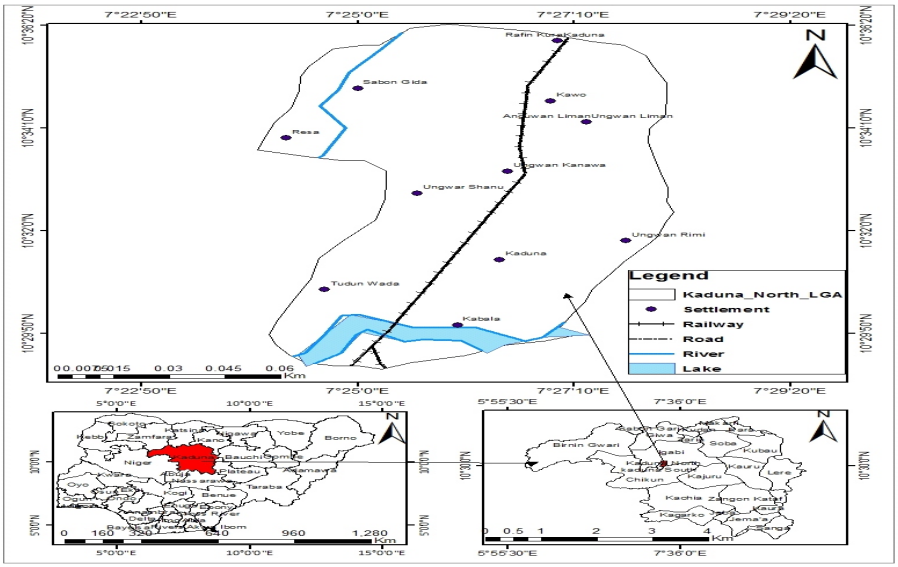
Parasites and infectious diseases occur in nearly all ecosystems [23] and can have detrimental effects on the health status of their host [24] yet the abundance and distribution of parasites have received little attention despite their pervasiveness, diversity, and potential impacts on host population and community dynamics [25, 26, 27]. Parasitic infections (nematodes, cestodes and trematodes) often contribute to low productivity and impair the health status of poultry [28]. Parasitism is one of the major problem which inflict heavy economic losses to the poultry in the form of retarded growth, reduced weight gain, decrease egg production, diarrhoea, obstruction of intestine, poor feathers, replacement birds that take long to reach maturity, morbidity and mortality. Stress from parasites could affect the blood picture and cause anorexia [29, 30]. Investigations elsewhere have demonstrated the presence of some gastrointestinal and haemoparasites in poultry. [31], [32] and [11] reported *Ascaridia galli, Eimeria* spp. and *Heterakis gallinarum* in guinea fowls around the Kainji game park, Kwara State, Nigeria. [33] reported *Gongylonema ingluvicola*, *Raillietina* species and *Ascaridia numidae* in guinea fowls in Zaria [11], reported Ascaridia galli Eimeria spp. And Heterakis gallinarum in guinea fowls around the Kainji game park, Niger State, Nigeria, and [13] reported a prevalence of 45% for cestodes infection in guinea fowls in Maiduguri. Other authors have similarly made report on the prevalence of helminth parasites in guinea fowls in Nigeria [33]. According to [33], nematodes and cestodes constitute the most important group of helminth parasites of poultry in the area studied. A considerable number of arthropods, earthworms and snails, have been implicated as intermediate hosts of helminths [22]. There is dearth of information about G.I.T. parasites affecting guinea fowls in Kaduna because apart from the study carried out by [33] in Zaria, there has been no known other study.

MATERIALS AND METHOD

Study Area

The study was carried out in Kaduna North L.G.A, Kaduna State.

Kaduna north local Government is located at Latitude 10° 34' 4. 80' N and Longitude 7° 27' 7.20'E.



Source: Ministry of Land and Survey. Kaduna State, 1992

Sample Collection

The sample size of this study was 155 based on the prevalence 88.9 % of helminths of Guinea fowl in Zaria as reported by [33]. The samples were collected using the randomised sampling technique.

Birds of both sexes were included in the study. The sample was collected for a period of 10 weeks, twice a week and 10 samples were collected per visit. Immediately after slaughter, the alimentary tract of each bird was collected in a polythene bag, labelled appropriately and transported in a cooler containing ice block to the Helminthology Laboratory of the Department of Veterinary Parasitology and Entomology, A.B.U Zaria. Faecal materials from each bird was collected to check for helminth eggs.

Identification of Endoparasites

The alimentary tract from the oesophagus to the cloaca was examined externally for gross lesions. The different sections of the G.I.T. were separated in Petri dishes and each section was opened longitudinally and the contents carefully washed through a sieve, helminths seen were picked out for identification. The mucosa was scraped to collect the helminthes (if present) embedded in the mucosal layer. Finally, the contents were examined under a stereomicroscope for presence and identification of helminths.

McMaster faecal egg count method

Two gram (2g) of faeces was weighed and thoroughly mixed into a polythene tube. Five ml of water was added to the faeces and broken with the aid of a glass rod. The polythene tube was filled up with water, closed with the lid and shaken very well. The sample was centrifuged at 2000 rpm for 3 minutes and the supernatant was decanted. 6 ml of the flotation medium was added, shaken thoroughly to loosen the faeces and then centrifuged at 2000 rpm for 3 minutes. The supernatant was saved in a graduated polythene tube, this was repeated twice.

After centrifuging twice, the fluid volume of the supernatant was added up to 12 ml by adding more flotation medium. Well mixed aliquot of the supernatant of each sample was charged in both chambers of the McMaster slide and FEC was done at x10 objectives. The number of helminths eggs per gram of faeces was obtained by multiplying the total number of eggs counted in the two squares of the McMaster slide by the dilution factor of 20.

Data Analyses

Descriptive statistics was performed for all the data obtained. One-way Analysis of Variance (ANOVA) with Tukey's multiple comparison tests was performed using GraphPad Prism Version 4.00 for Windows, GraphPad Software, San Diego California USA (www.graphpad.com), values of $p<0.05$ were considered significant.

RESULTS

Prevalence of Helminth infection / Egg Count

Of the 200 Guinea fowls examined, a total of 168 (84 %) were infected with helminth parasites. 140 (70 %) of the Guinea fowls were found to shed helminth eggs in their faeces (Table 1). A total of nine (9) helminths were recovered from the infected Guinea fowls – four (4) nematodes and five (5) cestodes. The nematodes identified were *Ascaridia numidae*,

Subulura brumpti, *Heterakis numidaenarum* and *Syngamus trachea* with prevalence of 57 % (114), 24 % (48), 10 % (20) and 10 % (20), respectively. *Raillietina tetragona*, *R. echinobothrida*, *R. cesticillus*, *R. magninumida* and *Hymenolepis carioca* were the cestodes identified with prevalence of 58 % (116), 33 % (66), 2.5 % (5), 0.5 % (1) and 0.5 % (1), respectively (Table 2).

The helminth eggs and oocysts recovered from the faecal samples were *Ascaridia*, *Capillaria*, *Syngamus*, *Heterakis*, *Raillietina*, *Strongyle* and *Eimeria* with a percentage prevalence of 55 % (110), 36 % (72), 29 % (58), 8.5 % (17), 7 % (14) and 0.5 % (1), respectively (Table 3). Except for 19.5 % (39) of the guinea fowls infested with a single helminth, most of the guinea fowls had mixed infestations with either two (28.5 %), three (25.5 %), four (10 %) or five (0.5 %) helminth parasites (Table 4).

Table 1: Prevalence of parasites of Guinea fowls slaughtered in Kaduna metropolis

	Egg count	Helminths	Non-infected
N	140	168	7
Prevalence (%)	70	85	3.5

N = number of guinea fowls infected

Table 2: Prevalence of gastrointestinal nematodes and cestodes of guinea fowls slaughtered in Kaduna metropolis

	Nematodes				Cestodes				
Parasites	***Ascaridia numidae***	***Heterakis gallinarum***	***Subulura brumpti***	***Syngamus trachea***	***R. tetragona***	***R. echinobothrida***	***R. magninumida***	***R. cesticillus***	***H. carioco***
N	114	20	48	20	116	66	1	5	1
Prevalence (%)	57	10	24	10	58	33	0.5	2.5	0.5
Total no. of helminths	2,804	98	639	53	3105	1,565	1	94	20
Mean per bird	24.60	4.90	13.31	2.65	26.77	23.71	1	18.80	20
Range	2 – 129	1 – 13	1 – 157	1 – 8	2 – 171	1 – 134	0 – 1	5 – 38	1 – 19

N = number of guinea fowls infected

Table 3: Prevalence of helminth eggs and coccidia oocyts of guinea fowls slaughtered in Kaduna metropolis

	Ascaris	*Capillaria*	*Syngamus*	*Hetarakis*	*Strongyle*	*Raillietina*	*Eimeria oocyts*
N	110	72	58	17	1	14	95
Prevalence (%)	55	36	29	8.5	0.5	7	47.5

N = number of guinea fowls infected

Table 4: Prevalence of guinea fowls with single or multiple infections in Kaduna metropolis

No. of species of helminths	N	Prevalence (%)
One	39	19.5
Two	57	28.5
Three	51	25.5
Four	20	10.0
Five	1	1.0
0	32	16.0
Total	**200**	**100**

N = number of guinea fowls infected

DISCUSSION

The overall prevalence of 84.0% recorded in guinea fowls in this study is slightly lower than those reported by [35, 36] and [21] in Guinea fowls in studies carried out in Vom Plateau, and Maiduguri, Borno States Nigeria, respectively. Some authors also reported higher prevalence rate for the local domestic chickens raised on free-range [37, 38, 39, 40, 41, 42, 43, 44, 45. 46]. On the other hand, several authors reported values that were lower than the prevalence reported in this study [47, 48, 19, 43, 49, 8, 50, and 51]. The helminth composition, prevalence and intensity reported in this study agrees with the studies of [35, 36], [37], [52], [53], [43, 54], [51] in Nigeria and [30] in Zimbabwe. This high prevalence rate could be attributed to the habit of domesticated fowls feeding on a wide range of diets under poor husbandry, and abundance of beetles, cockroaches and earthworms that could serve as intermediate or paratenic hosts, predisposing them to parasitic infections [19, 20]. Nevertheless, some minor differences exist in the helminth composition, prevalence and intensity of individual helminths between this study and the studies of the aforementioned researchers. The minor differences in the results of the present study could be explained on the basis of seasonal, management, climatic variations and also due to variation in parasitic population of different localities where the birds were exposed [55].

The more prevalent genus of helminths was cestodes with *Raillietina tetragona* as the most prevalent. This finding is similar with the findings of [33] who reported that *Raillietina*

tetragona had the highest prevalence rate for guinea fowls sampled in Zaria. Similar findings [55] in Kashmir, India in a research to determine the most prevalent gastrointestinal parasites in semi-scavenging backyard poultry. The results in this study also coincides with the observations of [38] who also reported that in chicks of Amhara region of Ethiopia, among cestodes, *Raillietina tetragona* showed the highest percentage of prevalence. The percentage prevalence of *Raillietina echinobothridia* observed from this study is lower than the observations of [40] and [41] but higher than the prevalence rate reported by [44] for free-range chicken in Abeokuta. *Raillietinna cesticillus* reported prevalence rate lower that those reported by [41], [56] and [57]. In general, the most dominant cestodes were the *Raillietina* spp which had since been known several decades ago to be cosmopolitan and contributes to nutrient depletion in birds as reported by [58] and [22]. The habit of free range poultry of scratching any material including cow dung to look for ants, beetles and maggots could account for the high prevalence of *Raillietina* whose intermediate hosts including ants and beetles, are maggots of *Musca domestica* [30] which are excessively abundant in Kaduna State.

Hymenolepis carioca had the lowest prevalence. Similar observations (51-59) had been reported, though with *H. carioca* having a higher prevalence

The nematodes recovered from the intestines of the Guinea fowls in this study were few. This coincides with the findings of [51]. This however, was different from the findings of [46], [43], [19], [57], [60], [61], [33] and [48], who all reported higher prevalence for nematodes. Among the nematodes, *Ascaridia numidae* showed the highest percentage of prevalence. The prevalence of *Ascaridia numidae* in this study was higher than the value reported by [33] but the values are still lower than the prevalence as reported by [35, 36], [62] and [37] in chickens. Since guinea fowls are more susceptible to the parasites, it might have accounted for the higher prevalence in this study.

Subulura brumpti also reported a high prevalence rate in this study. This was similar to the rate reported by [41] who found a comparable result in local domestic chickens in central Ethiopia, and [57] in North-Western Algeria.

The prevalence of *Heterakis numidaenarum* was found to be relatively similar to the prevalence rate reported by [37] and [33] in poultry and guinea fowls in Zaria, Nigeria. On the other hand, the prevalence rate in this study was lower than those reported by [45] and [41]. [57], reported *H. numidaenarum* as having the highest prevalence rate in their study conducted in Southern Nigeria, Central Ethopia, North-western Algeria, respectively. The differences in observed could be attributed to differences in geographical location. Despite the relatively low prevalence rate of *H. numidaenarum* in this study, it poses significant danger to the avian population due to its association with the protozoan *Histomonas meleagridis*, the causal agent of "blackhead" (enterohepatitis) of turkeys [8, 63, 64]]; as such guinea fowls could act as reservoirs of infection to locally domesticated chickens in this study area.

Syngamus trachea recorded a low prevalence rate. This is in agreement with the reports of [19] and [33] in Zaria, and [65] in Jos, who reported in their work that this parasite has low prevalence rate of infection compared to the other helminth parasites. [36] and [37] on the

other hand did not observe *S. trachea* in their study. This could be attributed to the fact that their study was conducted in a season when the conditions were not favourable for the abundance of the intermediate hosts.

The complete absence of trematodes in this study agrees with the study of [35], [53], [37], [33], [41], [19] and [66]. These findings could be associated with seasonal variations in the availability of free water which could have limited the exposure of the guinea fowls to snails, which are the intermediate host of trematodes, hence the absence in this study. Also, guinea fowls would prefer tree tops and hilly areas, these habitats could limit them from coming into contact with the gastropod intermediate host [67].

Conclusions and Recommendations

Majority of guinea fowls slaughtered within the Kaduna metropolis have high prevalence ~~rate~~ of gastrointestinal (cestodes and nematodes) which pose very serious problems to the guinea fowl population. It may be due to the absence of good management practices and hygienic conditions.

The gastrointestinal parasites recovered were four nematodes (*Ascaridia numidae*, *Heterakis numidaenarum*, *Subulura brumpti*, *Syngamus trachea*) and five cestodes (*Raillietina tetragona*, *R. echinobothrida*, *R. magninumida*, *R. cesticillus* and *Hymenolepis carioca*).

The most common cestode specie is *Raillietina tetragona* with prevalence of 58 % (116) while the most common nematode specie was *Ascaridia numidae* with prevalence of 57 % (114).

This study highlights the fact that gastrointestinal parasites present a serious challenge to the well being of guinea fowl in Kaduna.

It is suggested that appropriate parasite monitoring need to be invented in order to minimize the risks of strong infestations in the guinea fowl population in Kaduna metropolis.

Institution of a programmed control measure for improved harnessing of the potentials of guinea fowl production in Kaduna metropolis.

Poultry farmers should be encouraged to seek veterinary services in other to boost the guinea fowl production sector of agriculture.

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