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Prevalence of Gastrointestinal Helminth Parasites of Local Chicken Slaughtered at Jalingo Market, Taraba State, Nigeria

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SUMMARY

Gastrointestinal parasites constitute a serious problem to poultry production in Africa. But often times they are usually ignored by the majority of farmers. Whereas, it is one of the major leading causes of ill-health and high mortality rates in the poultry industry. This study was conducted to determine the prevalence of gastrointestinal parasites of chicken slaughtered at the Jalingo market. A total of 500 gastrointestinal tracts of local chicken comprising of 250 from males and 250 from females were collected from the poultry slaughtering and dressing section of the Jalingo market, and screened for gastrointestinal helminths using the saturated sodium chloride floatation techniques. An overall prevalence of 28.6% (143/500) was recorded with a prevalence of 16.8% (84/500) in males and 11.8% (59/500) females. Nine different species parasites comprising five nematodes and four cestodes, were recorded. Nematodes were the most predominant intestinal parasite with a prevalence rate of 89 (62.2%). And *Ascaridia galli* 45 (50.5%) was found to be the most prevalent nematode. Other nematodes observed were *Capillaria annulata* 13.4% (12/89), *Heterakis gallinarum* 2.2% (2/89), *Strongyloides avium* 32.5% (29/89), and *Syngamus trachea* 1.1% (1/89) having the lowest prevalence. Raillietina tetragona 57.4% (31/143) was the most prevalent cestode recorded. Other Cestodes were *Hymenolepis carioca* 27.7% (15/54), *Raillietina cesticellus* 12.9% (7/54), and *Davainea proglottina* 1.8% (1/54). No trematode was recorded in this study. This study showed that nematodes and cestodes were the common helminth parasites in local chicken. There is therefore the need for educating the farmers on the impact of gastrointestinal parasite infection in chicken and the need to institute good management practices so as to reduce their effects on productivity. Sex of the chicken had no statistically significant difference ($X^2 = 6.12$, $df = 1$; $P > 0.05$) on the prevalence of helminths.

Keywords: Prevalence, Domestic chicken, Gastrointestinal tract helminth, Jalingo, Nigeria

INTRODUCTION

The world's poultry population is on the increase as a result of the great demand for

poultry product by consumers (Philip *et al.*, 2019). The Food and Agricultural

Organization of the UN has estimated the total population of poultry in the world (Bruinsma, 2017) to be 14.718 million with 1.125 million distributed all over Africa, 1.520 million in South America, 6.752 million in Asia, 9 million in Oceania, 3.384 million in North America, and 1.844 million in Europe (Sebho, 2016). In many African countries, chicken production is reported to produce over US\$ 5.75 billion annually (FAO, 2010). Poultry is the second most widely consumed meat in the world. And in Africa, 25% of meat is considered to be from poultry, whereas in some areas it covers 100% of the animal protein available. The increased demand for poultry products has led to a rise in poultry production in almost all African countries. But the sector has been stated to have recorded a fall in production, partly due to infection of birds by diseases-causing agents including parasites. (Philip *et al.*, 2019). The increase in the population of humans in Nigeria to about 200 million, has necessitated the increase in poultry production. Nigeria can be ranked among countries with the largest poultry population in Africa continent. The largest group among domesticated livestock in Nigeria, consist of chicken (*Gallus domesticus*), guinea fowl (*Numida meleagris pallas*), turkey (*Meleagris gallopavo*), duck (*Anaplaiphyncho domestica*) and pigeon (*Columbia livia*) (Ambali *et al.*, 2003). Poultry production is a vital means of providing high quality protein for human consumption. This 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 to small scale farmers. The poultry industry has now been recognized as an important sub sector of Agriculture (Pandey, *et al.*, 1992). 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 provide man with high nutritional value and other socio-economic benefits which cannot be over emphasized (Matur, 2002), unfortunately the poultry industry is constrained by poor management practice, malnutrition and inadequate biosecurity in most developing countries (Nnadi and George, 2010). While disease causing agents involving viruses, bacteria and parasite have been linked to increase mortality in chicken production (FAO, 2010), gastrointestinal parasites are the most prevalent and devastating disease affecting chicken productivity in most developing countries (Poulsen *et al.*, 2000). 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; replacement birds that take long to reach maturity, egg production and over-all health (Junaidu *et al.*, 2014). It has been estimated that more than 750 million chickens, guinea fowls and ducks in Africa die each year as a result of various infection (Sonaiya, 1990). Although reduction in birds parasitic infection has been achieved in commercial production system mostly due to the improvement of house hygiene and management practices, but the prevalence of gastro-intestinal parasite is still very rampant (Pandey, *et al.*, 1992). Helminth parasites of poultry are commonly divided into three main groups; Cestodes, Nematodes and Trematodes. The teeming population of Jalingo the capital city of Taraba State due to the internally displaced persons (IDP) from her neighbouring states of Adamawa, Borno and Yobe state due to insurgency, has necessitated certain socio-economic measure towards meeting up with the standard of living which includes increased poultry production and its attendant management practices. Also, there is dearth of information about gastrointestinal helminths, variant species forms of parasites and other disease in the study area. And among diseases, gastro-intestinal helminth infections are often

neglected, whereas it is one of the major causes of ill-health and productivity loss in poultry production. All this necessitates carrying out this study.

MATERIALS AND METHOD

Study Area

Jalingo is the capital city of Taraba State and is one among the six states in the North-Eastern region of Nigeria with an estimated population of 118,000 persons. Jalingo is situated in the savannah-covered foothills of the shebshi mountain, about 25 miles (40km) south-east of river Benue. Two major seasons are experienced annually in Jalingo: the rainy and the dry seasons. The annual average rainfall is 100mm, with peak temperature of 41°C between February and March, the lowest temperature of about 20°C as seen between December and January. Jalingo is a market town which has a government dairy farm and numerous private poultry farms, and is connected by road with Wukari and Yola. The major occupation of the

people of Jalingo and Taraba state at large is crop farming and livestock production. Backyard poultry is the main practice of the people in Jalingo and Taraba state in general (NBS, 2016).

Sample collection

Fifteen to twenty gastrointestinal tract samples of local chickens collected twice weekly totalling up to five hundred, comprises 250 males and 250 females were collected from poultry slaughtering and dressing section of Jalingo market. These samples were transported in cold chain to the National Veterinary Research Institute (NVRI), Vom Jalingo zonal laboratory, Taraba state, Nigeria for analysis.

Sample processing

Faecal samples were screened using the saturated sodium chloride floatation techniques as describe by Soulsby (1982) and Ayeh-Kumil, et al., (2016).

Statistical Data Analysis

The results obtained from the examination of the sample was analysed using Chi-square (X^2) statistical test.

RESULTS

A total of five hundred gastrointestinal tracts of local chickens comprising of 250 from male and 250 from female were collected from Jalingo poultry market and examined for gastrointestinal helminth parasite (Table 1). Out of which overall prevalence of gastrointestinal helminth was 28.6% (143/500). 16.8% (84/500) male and 11.8% (59/500) female. More parasite were identified in male than in female chicken with prevalence within sex 33.6% (84/250) in male and 23.6% (59/250) in female (Table III). 9 different species of gastrointestinal helminth consisting of 5 Nematode and 4 cestode were identified. Nematode was the most prevalent parasite recorded with prevalence of 62.2% (89/143). And the *Ascaridia galli* was the most recorded 50.5% (45/89) nematode in this study. Others nematode identified were *Capillaria annulata* 13.3% (12/89), *Heterakis gallinarum* 2.2% (2/89), *Strongyloides avium* 32.5% (29/89) and *Syngamus trachea* 1.1% (1/89) with the lowest prevalence rate (Table II). *Raillietina tetragona* was the most prevalent cestode 57.4% (31/45) recorded. *Hymenolepis carioca* 27.7% (15/54), *Raillietina cesticellus* 12.9% (7/54), and *Davainea proglottina* 1.8% (1/54) were other cestode encountered in this study. No single trematode was identified in this study (Table II). Preference of parasite in relation to sex was recorded more in the males 84 (33.6%) than the females 59 (23.6% with the Nematode 50 (20%) and Cestode 34(13.6%) identified more in the males than 39 (15.6%) and 20 (8%) in the female respectively. Sex of the chicken was not associated with the prevalence of helminths (Table III).

TABLE I: Prevalence of Gastro-intestinal Helminths in Relation to Helminth species

Sex	No. of sample examined	No. of infected sample	Prevalence %
Male	250	84	16.8
Female	250	59	11.8
Total	500	143	28.6

TABLE II: Prevalence of Gastro-intestinal Helminths in Relation to Helminth species

Parasite species	No. infected species	Prevalence %
Nematode		
<i>Ascaridia galli</i>	45	50.5
<i>Capillaria annulata</i>	12	13.4
<i>Heterakis gallinarum</i>	2	2.2
<i>Strongyloides avium</i>	29	32.5
<i>Syngamus trachea</i>	1	1.1
	89	62.2 (89/143)
Cestodes		
<i>Davainea proglottina</i>	1	1.8
<i>Hymenolepis carioca</i>	15	27.7
<i>Raillietina tetragona</i>	31	57.4
<i>Raillietina cesticillus</i>	7	12.9
	54	37.7 (54/143)
Trematodes		
	-	-
Total	143	28.6 (143/500)

TABLE III: Prevalence of Gastrointestinal Helminths in Relation to Sex of Chicken

Parasitic species	No. infected male (n=250)	Prevalence (%)	No. infected females (n=250)	Prevalence %
Nematodes				
<i>Ascaridia galli</i>	25	50	20	51
<i>Capillaria annulata</i>	7	14	5	12.8
<i>Heterakis gallinarum</i>	1	2	1	2.5
<i>Strongyloides avium</i>	16	32	13	33.3
<i>Syngamus trachea</i>	1	2	-	-
	50	20	39	15.6

Cestodes				
<i>Davainea proglottina</i>	1	2.9	-	-
<i>Hymenolepis carioca</i>	5	14.7	10	50
<i>Raillaitina tetragona</i>	23	67.4	8	40
<i>Raillaitina cesticillus</i>	5	14.7	2	10
	34	13.6	20	8
Trematode				
	-	-	-	-
Total	84	33.6	59	23.6

($X^2 = 6.12$, $df = 1$ $P > 0.05$)

DISCUSSION

The domestic chicken feeds on varieties of food substances. These include grain, fruits and insects which may harbour infective stages of parasites thereby predisposing them to parasitic infection, mostly gastro-intestinal parasites (Frantovo, 2000; Oniye, *et al.*, 2001). A total prevalence of 28.6% of gastrointestinal helminth parasite was recorded in this study. As documented in so many reports, helminth parasites of chickens are prevalent in many parts of the world. In Southern Asia (Bangladesh and India), Alam *et al.*, (2014) and Hembram *et al.*, (2015) reported prevalence of 91% and 58.75% of gastrointestinal helminth in some indigenous chicken respectively. In Trinidad and Tobago; in the middle east country of Iran, Vandanaa *et al.*, (2009), reported prevalence of 96% of gastrointestinal parasite among chicken. In East Africa (Ethiopia and Kenya), Heyradin *et al.*, (2012) reported 89.5% prevalence in some scavenging chicken in Ethiopia. Although a previous study by Ashenati and Eshetu (2004) reported 90.21% gastrointestinal parasite in some poultry all in same country. While in Kenya, Mungube *et al.*, (2008) reported 93.3% prevalence in some scavenging birds. In Southern part of Africa (Zimbabwe and Zambia), Dube *et al.*, (2010) reported 100% prevalence in scavenging chicken in Zimbabwe while in

Zambia, Phiri *et al.*, (2007) reported 95% prevalence among indigenous chicken in Zambia. In West Africa so many reports are documented on prevalence of gastrointestinal helminths of chicken. Poulsen *et al.*, (2000) reported 100% prevalence of gastrointestinal and haemoparasites in young scavenging chicken in eastern region of Ghana. Ayeh-Kumi *et al.*, (2016) also reported 79.9% prevalence in chicken sold in major markets in Accra, Ghana. In Nigeria, several other previous documented reports abound. Nnadi and George (2010) reported 71.3% prevalence in selected villages. Similarly, Junaidu *et al.*, (2014) also reported 81.5% prevalence in some domestic slaughtered chicken. Similar documented reports from Plateau (Pam *et al.*, 2006); Zaria (Oniye, *et al.*, 2001); (Luka and Ndams, 2007); Bauchi (Yoriyo *et al.*, 2008); Sokoto (Shehu and Anka 2010). The difference in the prevalence of helminth in these studies could be due to the difference in number of birds examined and also in the incidence of the infective stages and intermediate host of the parasite in the area where the chicken feed, and also geographical location and duration of the work and season in which the work was carried out (Shehu and Anka, 2014). The difference in prevalence could also be related to the difference in management system, study method, sample size and control practice in the different countries (Ayeh-Kumi *et al.*, 2016). The group of

Helminth parasite commonly found in chicken includes nematodes, cestodes and trematodes were identified with trematodes completely absent. The outcome of this study is in accordance with Yoriyo *et al.*, 2008; Junaidu *et al.*, (2015); Philip *et al.* (2019), in which Cestodes and nematodes were implicated as the most common intestinal and major cause of Helminth infection in domestic chicken. Other reports by (Pam, *et al.*, 2006; Luka and Ndams, 2007) also incriminated the nematodes and the cestode as very important parasites of birds. The main feature in this study which show complete absence of trematodes is in agreement with several previous documented studies by Luka and Ndams, (2007) in Zaria and Yoriyo *et al.*, (2008) in Bauchi, Aye-Kumi *et al.*, (2016) in Ghana which all showed complete absence of trematodes in their studies. The absence of trematodes is linked to their complex life cycles requiring at least an aquatic intermediate host, which help in to break the life cycle where water is not present and help in reducing the spread of the worms (Shehu and Anka, 2014). A total of 9 different species of intestinal helminthes of poultry were encountered in the present study. The nematodes were the predominant species identified with a prevalence of 62.2% (89/143). Consisting of *Ascaridia galli* 50.5% (45/89) *Capillaria annulata* 13.3% (12/89), *Heterakis gallinarum* 2.2% (2/89), *Strongyloides avium* 32.5% (29/89) and *Syngamus trachea* 1.1% (1/89). As documented by Jordan and Pattison (1996), the nematodes constitute the most important group of helminths parasites of poultry both in number of species and the extent of damage caused by these agents, *Capillaria*, *Heterakis*, and *Ascaridia* are the major genera. The reasons for the high prevalence may be that the nematodes do not require intermediate host and at the same time they are soil transmitted parasites. The adults lay several eggs every day which can maintain their viability for as long as twelve months and so domestic fowls continuously pick up viable eggs

from the dropping that contaminate the environment as they scavenge for food in the surrounding (Permin and Hansen, 1998) and this also predispose them to heavy parasite burden. *Ascaridia galli* predominates having the highest prevalence rate 50.5% (45/89). *A. galli* which is a round worm that affect young birds more severely. Mild infection may go unnoticed but large number of worms may interfere with feed absorption thereby leading to poor growth of chicken (Smyth, 1976). *A. galli* is a large round worm of poultry located in the small intestine; it may penetrate the duodenal mucosa, resulting in haemorrhage and diarrhoea, in laying birds. *Ascaridia galli* is occasionally found viable or calcified in the albumin portion of an infected egg (Soulby, 1982). Their eggs are resistant to the environment and can stay alive outside for a very long time. The host passed out the eggs from it faeces and it develop into the infective stage in the open, contaminating feed and water sources. Different host become infected when they pick and ingest the infective egg from these sources. In the deep litter system, the egg maybe infective for years depending on the temperature, humidity, pH and ammonium concentration and so where proper management practices are not in place, feed and water sources of birds can easily be contaminated, as farm handlers can carry the eggs of these parasite from other sources to the farm (Aye-Kumi *et al.*, 2016). This species is reported in several studies as the commonest and most important helminth infection of poultry (Jordan and Pattison, 1996). The high prevalence of the nematode helminth over that of the cestode is in agreement with several documented reports from different part of Nigeria: In Zaria: Oniye, *et al.*, (2001); Jos-Plateau: Pam, *et al.*, (2006); Zaria: Luka and Ndams (2007); Bauchi: Oriyo, *et al.*, (2008); Abuja (FCT): Matur *et al.*, (2010) and in Kaduna: Junaidu *et al.*, (2014). This also in agreement with reports from: Algeria: Hassouni and Belghyti, (2006); Zimbabwe: Dube *et al.*,

(2010); Ethiopia: Heyradin *et al.*, (2012); India: Sonune, (2012) and Ghana: Aye-kumi *et al.*, (2016). However, this is not in agreement with the studies of Ashenati and Eshetu (2004) from central Ethiopia, which reported high prevalence of cestode compared to nematodes. The *Syngamus trachea* is the nematode that recorded very low prevalence rate 1.1% (1/89). This is in agreement with Pam, *et al.*, (2006); Luka and Adams, (2007) and Matur, *et al.*, (2010), who reported in their work that this parasite has low prevalence rate of infection compared to other helminth parasite. *Strongyloides avium* 32.5%, and *Capillaria annulata* 13.3% also had a remarkable prevalence. While *Heterakis gallinae* had prevalence of 2.2% in this study. Cestode infection in chicken are known to cause slow growth rate, enteritis, diarrhoea and haemorrhages in young chicken (Ashenafi and Eschetu, 2004; McDougald, 2011). Cestode generally undergo an indirect mode of transmission where they make use of intermediate host such as ants, grasshoppers, and beetles to spread their transmission. These organisms serve as diet for scavenging birds and therefore transmit the infective stage of the parasite to birds upon ingestion (Aye-Kumil, 2016). Four cestodes consisting of: *Davainea proglottina* 1.8% (1/54), *Hymenolepis carioca* 27.7% (15/54), *Raillietina tetragona* 57.4 (31/54) and *Raillietina cesticellus* 12.9% (7/54) were encountered in this study. The *Raillietina tetragona* is the major cestode in this study. These parasites are known to deplete nutrients from their host (Souby, 1982). In this study, out of the overall prevalence of 28.6% (143/500), prevalence within helminth indicate more gastrointestinal parasite were identified in the male 16.8% (84/500) then in female 11.8% (59/500). Also prevalence within sex also indicate that the gastrointestinal helminth showed high preference for male 33.6% (84/250) than in the female 23.6% (59/250). This is in agreement with report by Shehu and Anka (2014), who also reported low prevalence in female than

male. The lower prevalence in female birds in this study could be due to the fact that female birds reduce their feeding habits during the incubation period and concentrate more on grains and food remnant, being served to them during incubating period, because most farmers take special care of incubating birds by giving them food and water to compensate for the time spent in incubatory (Luka and Ndams, 2007). While it is in contrast with reports by Matur *et al.*, (2010) and Philip *et al.*, (2019) where the helminth parasite showed some degree of preference for the female birds than male. In this study, sex of the chicken had no association with the prevalence of helminths. This finding is in agreement with reports by Junaidu *et al.*, (2015).

CONCLUSION

This study revealed the presence of nematode and the cestodes as the common gastrointestinal helminths in chicken slaughtered at Jalingo market. The report also indicate that the male had higher prevalence rate of gastrointestinal helminth than the female. Even though there was no association between the sex of birds and gastrointestinal helminth. There is therefore the need for educating the farmers on the impact of gastrointestinal parasite infection in chicken and the need to institute good management practices so as to reduce their effects on productivity.

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