



## INTERNATIONAL JOURNAL OF PHARMACEUTICAL RESEARCH AND BIO-SCIENCE

### CO-INFECTION OF HELMINTHES AND PROTOZOAN PARASITES IN THE GASTRO INTESTINAL TRACT OF THE DOMESTIC FOWL *GALLUS GALLUS DOMESTICUS*: GALLIFORMES IN PARTS OF NIGERIA.

DR. E.J. OKAFOR – ELENWO, DR. A. C. ELENWO

1. College of Natural and Applied Sciences, Department of Biological Sciences, Igbinedion University Okada Edo State, Nigeria,
2. Faculty of Agriculture, Department of Animal Science and Fisheries, University of Port Harcourt, Nigeria.

**Accepted Date: 10/02/2014; Published Date: 27/02/2014**

**Abstract:** A study on the co-infection of helminth and protozoan parasites in the gastro-intestinal tract (GIT) of *Gallus gallus domesticus* was carried out over a period of six months in Obio/Akpor and Port Harcourt City Local Government Areas of Rivers State, Nigeria. Two hundred and fifty (250) domestic fowls raised in deep litter in forty-five (45) poultry farms were examined, clinical and parasitological examinations of the posted carcasses were carried out. All the birds on examination were found to be infected, with either helminth or protozoan parasites or both, and were located mainly between the gizzards and the caeca in their gastro-intestinal tract. There was a high prevalence of co-infection of helminth and protozoa infection in the birds (N=162; 64.8%) compared to that of the single infection (n=88; 35.2%) with either helminth or protozoa parasites. The prevalence of single helminthic infection of the birds (47 out of 250) was 18.3% while that of the protozoan parasites (41 out of 250) was 16.4%. The difference between the number and percentage of carcasses found with combined infection of helminthosis and coccidiosis and those with single infection of helminthosis and coccidiosis was obvious >40%; (N=74). The helminthes found were of the class Nematoda- *Ascriidia galli* (intestine); *Heterakis gallinarium* (caeca); *Capillaria* sp. (gizzard and upper intestinal tract), while protozoa found belongs to *Eimeria* sp, and located in the intestine and caeca of the birds.

**Keywords:** Parasites, helminthes, protozoa, domestic fowl, co-infection.

**Corresponding Author: DR. E.J. OKAFOR – ELENWO**



PAPER-QR CODE

**Access Online On:**

[www.ijprbs.com](http://www.ijprbs.com)

**How to Cite This Article:**

EJ Okafor-Elenwo, IJPRBS, 2014; Volume 3(1): 440-449

## INTRODUCTION

Port Harcourt and Obio/Akpor Local Government Areas (PHALGA and OBALGA) are two Local Government Areas of Rivers State, Nigeria that can be simply described as urban. Most poultry production activities in the state occur at the sub-urban and rural communities<sup>[1]</sup>. It is however interesting to note that despite the high urbanized level of Port Harcourt City and Obio/Akpor Local Government Areas, a substantial level of poultry production activities exist in these parts of Rivers State. Not less than eighty-two (82) poultry farms (ranging from those with one hundred (100) birds to those with three thousand (3000) birds at a time) exist in these urban Local Government Areas. However, there are some other poultry production activities not considered here, as the number of birds involved are less than one hundred (100), and others not of exotic group nor of any organized husbandry system.

The birds in this study were those reported dead and brought to one of the veterinary clinics in Port Harcourt where the farmers involved sought 'solace' in. The farms from which these birds came practiced the deep litter system under the intensive system of poultry husbandry.

A number of studies had been carried out by many researchers on the various gastro-intestinal parasites of the exotic domestic fowl (*Gallus gallus domesticus*; Galliformes), and a few other poultry birds in various parts of the world especially, Nigeria<sup>[2-12]</sup>.

However, none of these workers addressed nor reported cases of the occurrence of both helminthes and protozoa parasites of the gastro-intestinal tract of the domestic fowl in the same bird and at the same time. All the farms from which the posted dead birds were reported had carcasses in which both helminthes and protozoa occur concurrently.

This paper is restricted to the domestic fowl (*Gallus gallus domesticus*; Galliformes) because all the birds so examined were domestic fowls. Moreover most (over 95%) of the poultry farms in the area studied were mainly involved in raising domestic fowls, thereby alluding to the report of<sup>[13-14]</sup>, that most of the poultry production activities in West Africa and in Nigeria (in particular) are mainly involved in raising of domestic fowls.

This study is based on observed frequent cases of dead birds whose causes were found through post mortem examination to be gastro-intestinal parasites.

## MATERIALS AND METHODS

The domestic fowls used in this study were obtained from various farms in Port Harcourt City and Obio/Akpor Local Government Areas of Rivers State.

### Collection and Examination of the specimens

The domestic fowls (*Gallus gallus domesticus*) of different ages (2 weeks to over 36 weeks old) were used. These birds composed of layers and broilers respectively, all of which were being raised in the deep litter system. The birds were already dead when brought for post mortem examination at 'SAVES' Veterinary Clinic Choba Port Harcourt.

The case history of the birds were taken and the dead birds examined before they were opened up by dissection on the post-mortem table for the necessary lesions to be exposed, and noted accordingly. A total of two hundred and fifty of the birds examined were found to have gastro-intestinal parasites. Affected parts tissues and organs were collected for necessary analysis and observations of the contents. The gastro-intestinal tracts (from oesophagus to the caeca and cloaca) of the birds were specifically ligated/tied off at various points and examined. These ligated parts (viz oesophagus, crop, gizzard, intestine and caeca) were separately opened and their contents washed into various containers under running water. After thorough mixing, each sample was transferred to suitably labeled containers and preserved in 10% formalin. The mucosal walls of these tissues/organs were also scrapped into the containers and preserved. The contents were exposed to 8.2mls of iodine for easier identification of the parasites.

After thorough mixing, 4mls of the suspension was transferred to a petri dish in each case for parasite identification. The worms found were isolated, washed in saline and preserved in 10% formalin. The smaller and thinner worms were examined and seen under a (magnifying) lens and the microscope for a clearer view and identification.

The parasites seen were identified on the basis of their sizes, shapes, location/predilection sites and lesions on the mucosal walls and luminal contents of the tract. Familiarity with the foregoing based on the earlier training and years of practical experience in veterinary pathology and post mortem examination and the reports of<sup>[15-17]</sup> made it possible for the researchers/authors of this paper to reasonably identify these parasites as helminthes (particularly nematodes) and protozoa (particularly coccidial protozoan) in the birds examined.

### RESULTS

A total of two hundred and fifty carcasses of the domestic fowl (*Gallus gallus domesticus*: Galliformes) were found to have had one type of gastro-intestinal parasites or the other (particularly helminthosis and coccidiosis). Out of this number, eighty-eight (88) of the birds (35.2%) had only live adult worms (helminthes) and/or typical lesion indicating the presence of gastro-intestinal worms (i.e. gastro-intestinal helminthiasis) or coccidial protozoa infestation (i.e. coccidiosis) table1. Forty-seven (47) birds carcasses (18.4%) of gastro-intestinal parasites infected birds have only helminthes while forty-one birds carcasses (16.5%) of the gastro-

intestinal parasites infected birds were oocysts and/or typical lesion of protozoa infection (coccidiosis) table1.

The other total of one-hundred and sixty-two (162) birds carcasses (64.8%) of gastro-intestinal parasite infected birds has a mixture of helminthes and protozoan parasites or their typical lesions. The difference between the numbers of carcasses found with helminthosis and coccidiosis alone respectively and those with a mixture or combined infection of helminthosis and coccidiosis is obvious (table II).

Four types of parasitic agents were obtained from various parts of the gastrointestinal tract of the domestic fowl carcasses examined. These were *Ascariidia galli*, *Heterakis gallinaerium*, *Capillaria* sp.(helminthes) and *Eimeria* sp. (protozoan). The site of action for each of these endo-parasites in the domestic fowl is shown in table3.

The fore-going and the various observations were based on case history taken. Gross and microscopic examinations of the organs and tissues of the posted birds/carcasses showed, (if not confirmed) that the losses that affected two hundred and fifty poultry birds domestic fowls were due to gastro-intestinal parasites. Majority (64.8%) of the losses were caused by a mixed infection of the birds, involving both gastro-intestinal helminthes and protozoa in the same bird at the same time. Only 35.2% of the birds has and were lost due to 'single-type' infection of either helminthes or protozoan parasites.

Unfortunately, there are no known records or reports of such co-infection as causing such significant losses in poultry production as observed and is being reported in this work.

**Table 1:** Prevalence of single GIT parasite type (i.e helminthosis or coccidiosis) in the posted birds.

	Number and percentage of birds with single GIT parasite type.		Number and percentage of birds with single GIT parasite in total population.	
		Percent infection	Number of infected birds	Percent infection
Coccidiosis	41	46.3	41	16.8
Helminthosis	47	53.7	47	18.6
Total	88	100	88	35.2

**Table 2:** Comparison of birds with single GIT parasite infection and those with co-infection of GIT parasites.

	Total with either helminthosis or coccidiosis	Total with co-infection of helminthosis
Total	88	162
%infection	35.2%	64.8%

**Table 3.** Parasites from different parts of the gastrointestinal tract of the domestic fowls

Parts of the body	Helminth parasites	Protozoan parasites
Intestine	<i>Ascaridia galli</i>	<i>Eimeria</i> sp.
Caeca	<i>Heterakis gallinarium</i>	<i>Eimeria</i> sp.
Gizzard	<i>Capillaria</i> sp.	-

## DISCUSSION

There is no gain saying to the fact that quite a significant level of commercial poultry production activities (especially of domestic fowl) is taking place in Port Harcourt and its environs<sup>[1]</sup>. Over two hundred and fifty (250) commercial poultry farms of various scales exist in Port Harcourt and its environs in addition to the numerous homesteads (i.e household-keeping of local/ domestic fowl-*Gallus gallus domesticus*) on free range or semi-intensive husbandry system especially in villages and rural settings around and/or within Port Harcourt.

The high number of dead exotic domestic fowls associated with gastro-intestinal parasites (helminthes (worms), and protozoa particularly coccidiosis) observed in the present study was a great problem in poultry management which calls for concern. The presence of helminth and coccidial (*Eimeria* sp.) organisms and the related lesions in the gastro-intestinal tracts of the carcasses found in this study agree with the findings of<sup>[18]</sup> who reported some groups of protozoa of veterinary importance which occur in the gastro intestinal tract and associated organs of domestic animals (including poultry) in Nigeria, known to cause *Coccidiosis*, *Histomoniasis* and *Balantidiosis*<sup>[2]</sup>.

In addition<sup>[17]</sup> reported that many species of parasites inhabit the gastro-intestinal tract of domestic fowl anatomy and do interfere with its physiology. Parasitic nematodes, cestodes and trematodes were found in the faecal droppings of domestic fowls obtained from various markets in Plateau State, Nigeria and reported by<sup>[2]</sup>.

The findings of researchers like<sup>[1,3,6,8,9,12,14,19,20]</sup> from different parts of the world, confirmed the presence of parasites in the gastro-intestinal tract of the domestic fowl. Most of the aforementioned workers reported only the occurrence of helminth parasites.

However<sup>[1,17,20,21]</sup> in their studies did report the presence of protozoa (*Eimeria* species) in the gastro intestinal tract of the domestic fowls. *Eimeria* sp has been reported as the most common protozoan and exhibit the most economic implications on the livestock industry (including poultry)<sup>[15,17,18]</sup>. This was corroborated by<sup>[1]</sup> by observing that the only protozoa incriminated in this assessment of gastrointestinal parasites of exotic domestic fowls in Port Harcourt and its environs was *Eimeria* sp.

Some helminthes have been identified to cause damages in the gastrointestinal tract of the domestic fowls. These include nematodes and cestodes<sup>[17]</sup>. The significant losses in poultry production due to the co-infection of the helminth and protozoa infection found in this study location, however, had not been previously reported. The high rate of mixed infection may not be unconnected with the level and type of husbandry practices being carried out on the farms from which the birds came. Not less than 95% of the farms in the area under study are operating the deep litter production method, in which the birds are reared on the floor covered with wood- shavings.

The littered floors according to<sup>[15,17,21]</sup>, provided good breeding grounds for both the helminthes and protozoa as they are mostly damp with the 'excreted' wastes (faeces) of the birds. Other sources of contamination include, water from the drinking troughs of the birds, leaking roofs of the poultry pens/houses, or improperly constructed ones which allow water especially from the rains onto such pens/houses or percolated water from the soil underlying the floor. In fact, this researchers observed that some of the pens do not have cemented floors and as such it is easier for the parasites to be introduced or maintained in the pens/houses.

In line with the findings and reports of<sup>[15-17]</sup> on gastro-intestinal parasites of poultry, most insects and other arthropods, rats, lizards, humans (especially poultry attendants) and even practicing veterinary personnel equipment and wild birds, have been implicated in the transmission of gastro-intestinal parasites of domestic fowl in the poultry farms. These could contaminate the environment, poultry houses, feeds and water with infective stages of these gastro-intestinal parasites.

## CONCLUSION

This study reveals the existence of co-infection of helminth and protozoan parasites in most of the birds examined. However, the possible explanation for now could be that the prevailing environmental and climatic factors as well as the management practices of the farmers in this

area may be responsible for this condition. The tropical environment and the fact that these birds are raised on deep litter which easily traps water from rain, the water trough get tipped over or even leak out water which soil the litter and make it possible for the parasites to breed. These favour the sustenance of both the helminthes and the coccidial organisms in the farms.

The observations and report presented in this study throw another challenge of finding a drug that can be used in the treatment of both diseases at the same time. For example, drugs like avermecthins and/or their derivatives are already known to be effective against both the endoparasitic helminthes (especially nematodes) and ecto parasite (like some insects, ticks, lice, fleas, mites, e.tc.) or pests.

It appears that most (if not all) of the work so far done on the treatment of gastro intestinal parasites of poultry may have been individualistic and separately for either helminthes or protozoa (*Emieria* sp).

## REFERENCES

1. Elenwo AC: Gastro-intestinal parasites of Exotic Domestic fowl and their effects on commercial poultry production (Dissertation) University of Port Harcourt.(2000); 35-40.
2. Fabiyi JP: Incidence of helminth parasites of the Domestic fowl in Vom area of Plateau State, Nigeria. Bulletin of the Epizootic Diseases in Africa 1972; 20: 233-299.
3. Hodasi JKM: Comparative studies on the Helminth fauna of nature and introduced domestic fowls in Ghana. Journal of Helminthology 1979; 42: 35-52.
4. Obioha FC, Nwosu CC, Gown F, Etim DE, Obanu ZA, Ihemelandu E and Onuora GI: Comparative meat yield and anthropometric indices of the Nigerian Chicken and exotic strain. World Review of Animal Production 1983; 9: 59-64.
5. Obamu ZA, Obioha FC, Nwosu CC and Nwafor WE: Evaluation of the Organoleptic and Chemical Characteristics of Meat from the Nigerian native chicken and exotic strain. World Review of Animal Production, 1984; 20: 53-57
6. Fakae BB, Umeorizu JM and Orajaka LSE: Gastro-intestinal helminth infection of the domestic fowl (*Gallus gallus domesticus*) during the dry season in Eastern Nigerian, Journal of African Zoology, 1991; 105: 503-508
7. Mpoame M and Agbede G: The Gastro-intestinal Helminth infections of the domestic fowl in Dschang, Western Cameroun. Review d'Élevage et de Médecine Veterinaire de pays tropicqux, 1995; 48: 147-157.

8. Fakae BB and Nwalusi CU: Rainy Season Helminths Infections in the domestic fowl (*Gallus gallus domesticus*) In Eastern Nigeria. Book of proceedings 25<sup>th</sup> Annual NSAP conference Umudike, 19-23 March (2001), 2002; 292-295.
9. Irunga R, Kimani N and Kiasia SM : Helminth parasites in the intestinal tract of indigenous poultry in parts of Kenya. Journal of South African Veterinary Association 2004; 75 (1): 58-59.
10. Yoriyo KL, Adang J, Fabiyi P and Adamu SU: Helminth parasites of local chicken in Bauchi State Nigeria. Science World Journal 2008; 3(2): 35-37
11. Kaingu FB, Kibor AC, Shivairo R, Kutima H, Okerio TO, Wachenya R and Kali AK: Prevalence of gastro intestinal helminthes and coccidian in indigenous chicken from different agro-climate zones in Kenya. African Journal of Agricultural Research 2010; 5(6) 450-462.
12. Nnadi PA and George SO: A cross sectional survey on parasites of chicken in selected villages in the sub humid zones of South Eastern Nigeria. Journal of Parasitology Research 2010; 10:1155
13. Adegbola AA, Are L, Ashaye T L and Komolage MF: Agricultural Science for West African Schools and Colleges Oxford Universities Press, Ibadan Nigeria (1973) 153-166.
14. Oyeka CA: Prevalence of Intestinal helminthes in Poultry farms in Anambra State, Nigeria, Bulletin of Animal Health and Production in Africa 1989; 37: 211-220.
15. Soulsby EJL: Helminthes, Arthropods and Protozoa of domesticated animals. 6<sup>th</sup> Edition, Bailliere London (1968); 15-17
16. Shah-Fischer M and Say RR: Manual of Tropical Veterinary Parasitology C. A. B International (1981); 119-151.
17. Fraser CM, Mays A and Hueber RA: A Handbook of Diagnosis, Therapy and Diseases Prevention and Control for veterinarians. 8<sup>th</sup> Edition Merch and Co. Inc. Railway, New Jersey, U. S. A(1987); 93.
18. Olaka OS: A Laboratory Manual for the diagnosis of animal Parasites diseases. University of science and Technology, Port Harcourt. River State (1997); 36-46.
19. Gadama EN and Srivastava GC: Prevalence of Intestinal Parasites of Market Chicken in Bornu State. Zariya Veterinarian 1986; 1:126-128.

20. Olaka OS and Wekhe SN: The Role of gastro-intestinal parasites in Livestock in Port Harcourt and Environs, River State. Delta Agric.1997; 4:1-5.

21. Baines BS: A manual of Poultry Diseases. F. Hoffmann La Rache and Company Ltd. Switzerland (1972); 5-7.