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Prevalence of Intestinal Helminthes with Respect to Age, Sex and Breeds of Chicken Slaughtered at Eke Awka Market, Awka, Anambra State, Nigeria

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Authors' contributions

This work was carried out in collaboration among all authors. Authors CAI and JC Ozougwu designed the study, carried out the laboratory analyses for the study. Author JCO performed the statistical analysis, wrote and proof-read the manuscript. Authors JEE, OPO, GUA, SCE and JC Ogbodo managed the literature searches and wrote the protocols. All authors thoroughly proof read and approved the final manuscript.

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ABSTRACT

Aim: This research was designed to assess the prevalence of intestinal helminthes with respect to age, sex and breeds of chicken slaughtered at Eke-Awka Market, Awka, Anambra State, Nigeria.
Methodology: Fecal specimen was obtained from 150 Chicken slaughtered at Eke-Awka, Market, Anambra State, Nigeria from August to October 2019. The Fecal specimen was processed following floatation and the formalin-ethyl acetate concentration techniques. The collected data was analyzed using descriptive statistics to get the percentage prevalence and chi-square to determine the association of prevalence in relation to age, sex and breeds of the chickens; level of significance was set at $P < 0.05$.

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Results: Out of the 150 fecal specimens examined, 63 were found to be infected with intestinal helminthes parasites, giving a prevalence of 42%. The parasites found were *Ascaridia galli, Heterakis gallinarum* and *Raillietina cesticillus. Raillietina cesticillus* was observed to have the highest prevalence which is 16.7%. With respect to gender, a total of 38 males were found to be infected by helminthes parasites and the prevalence among males was 25.3%. *Raillietina cesticillus* infected the highest number of male chickens 17 (44.7%). A total of 25 female chickens were infected, with a prevalence of 16.7%, *Ascaridia galli* infected the highest number of female chickens 11 (44%). With respect to age groups, a total of 24 chickens aged (0 – 5) months were infected with a prevalence of 16%. *Raillietina cesticillus* had the highest infection rate 12 (50%). In the age group (6 – 10) months, a total of 21 chickens were infected giving a prevalence rate of 14%. *Ascaridia galli* recorded the highest infection rate 9 (49.9%). Among age group 11 months and above, the total number of infected chickens was 18, giving a prevalence rate of 12%. *Heterakis gallinarum* recorded the highest infection rate 8 (44.4%). With respect to breeds, a total of 28 old layer chickens were found to be infected by helminthes parasites and its prevalence was 18.7%, *Raillietina cesticillus* had the highest infection rate 13 (46.4%). The broiler had a total infection rate of 22 which gave a prevalence of 14.7%. *Raillietina cesticillus* had the highest infection rate of 9 (40.9%). Among the Native chickens, the total number of infections was 13 and its prevalence rate was 8.7%. *Ascaridia galli* recorded the highest infection rate which was 8 (61.5%).
Conclusions: The overall prevalence of intestinal helminthes was 42%, the helminthes parasites found were *Ascaridia galli, Heterakis gallinarum* and *Raillietina cesticillus. Raillietina cesticillus* was observed to have the highest prevalence 16.7%. Government and poultry owners should ensure that good caging and management systems are adopted to prevent the spread of intestinal helminthes among chickens so as to ensure maximum output from poultry production.

Keywords: Prevalence; sex; age groups; breed; intestinal helminthes chickens.

1. INTRODUCTION

Parasites are key infectious agents that constitute major challenge in poultry industry as they impose hefty economic damages. The clinical manifestations of diseases of poultry include reduced weight gain, stunted growth, diarrhea, reduced egg production, intestinal blockage and reduced feather [1-3]. Helminthes parasites are implicated as key reasons for diseases of chicken, reduced poultry out and deaths [4,5]. Domestic chicken is usually fed on varied food materials which include fruits, cereal and insects that harbor infective stages of parasites thus predisposing them to parasitic infection, predominantly gastrointestinal helminthes parasites [6,7]. The entire poultry population globally is projected to be 14.718 million [8] with 1.125 million dispersed all over Africa, 6.752 million in Asia, 1.520 million in South America, 9 million in Oceania, 1.844 million in Europe and 3.384 million in North America [9]. In Nigeria, poultry is a vital part of the livestock industry with an entire population of about 200 million [10,11]. This sector offers money, occupation and protein for rural and urban occupants together with manure for crops [11]. Nevertheless, the quantity of poultry products are far less than that needed, commonly because of losses met in the poultry business, which have been connected to disease causing agents especially helminthes parasites [12,13]. It is well documented that roughly 750 million chickens and other domesticated birds throughout Africa die yearly due to various infections [14]. A lot of reductions in parasitic infections of chicken have been attained in production because of better hygienic, housing and management practices, however the prevalence of helminthes parasite is still widespread [15,16]. It is well established that adequate knowledge of the gastrointestinal parasites of domestic chickens and predilection location is indispensable to swift disease diagnosis and treatment [17]. The prevalence of helminthes infections could be swayed by many elements such as sex, age and breeds of chicken. It is well documented that climatic situations could change the population dynamics of the parasites leading to intense variations in the prevalence of helminthes infection [18]. Some reports have explored the occurrence of helminthes parasites in chickens in many areas of Nigeria [19,4] with no report to the best of our knowledge from Anambra state precisely Awka. This present research was commenced to fill this knowledge gap by determining the prevalence of intestinal helminthes with respect to age, sex and breeds of chicken slaughtered at Eke-Awka Market, Awka, Anambra State, Nigeria.

2. MATERIALS AND METHODS

2.1 Study Area

The study area was Eke-Awka Market, Anambra State, Nigeria where most of the chickens consumed by the inhabitants were slaughtered. Awka is the capital city of Anambra State, Nigeria and it had an estimated population of 301,657 as at the 2006 Nigerian census. Awka is located directly North of Port Harcourt in the center of a densely populated Igbo heartland in South East Nigeria and lies in latitude 6°12'N and 7°04'E. The temperature at Awka is usually 27-30 degrees between June and December but may rise to 33 - 34 degrees between January and April.

2.2 Study Design and Specimen Collection

The study was conducted between August and October, 2019. Fecal specimen of one hundred and fifty (150) chickens of different age groups, sex and breeds, were collected from the intestines of the slaughtered chickens at Eke-Awka Market and used for this study. They were taken to the Parasitology Laboratory, Department of Biosciences, Nnamdi Azikiwe University for examination. Fecal specimens were prepared using the simple floatation and the formalin-ethyl acetate concentration techniques. The floatation technique was done following the method of [20]. Temporarily, 2 g of each fecal specimen was mixed with some quantity of saturated NaCl solution and sieved into a glass test tube. Subsequently, the mixture was filled to the top using the saturated NaCl solution, and a clean coverslip was gradually placed on top of the test tube, circumventing spillage. The coverslip was left for nearly 15 to 20 min; thereafter, the coverslip containing the harvested eggs were placed on a clean slide and examined with the light microscope at 10× and 40× objective lenses. The formalin-ethyl acetate concentration technique was performed following the method of [15]. Momentarily, about 2 g of each fecal specimen was dissolved in 10% formalin and filtered into a plastic test tube to the 7 ml mark and permitted to stand for some minutes, thereafter 3 ml of ethyl acetate was added. The tube was covered, strongly shaken by hand for about 1 min, and centrifuged at 3000 rpm for nearly 5 minutes. The debris plug was softened, and the top three layers were cast-off. Iodine stain was prepared with the sediment, and the entire sediment was examined on a neat glass slide and covered with a neat coverslip. The glass slides were examined making use of 10× and 40× objective lenses. The eggs from the processing methods were identified using the methods of [20-22].

2.3 Calculation of Prevalence (%)

The total prevalence (%) of each parasitic helminthes was determined as the total number of chickens infected with each parasitic helminthes divided by the total number of chickens sampled (150).

2.4 Data Analysis

The data collected was analyzed using descriptive statistics to assess the prevalence percentage and chi-square, to determine the association between prevalence with respect to age, gender and breeds of the chickens. The resulting output was presented in tables and the level of significance was set at $P < 0.05$.

3. RESULTS

In this study, 150 chicken fecal specimens were examined, 63 specimens were found to be infected with intestinal helminthes, giving a prevalence of 42%. The helminthes found in the fecal specimen of the chickens were *Ascaridia galli*, *Heterakis gallinarum* and *Raillietina cesticillus.* However, the transmission pattern of the different helminthes varied, with *Raillietina cesticillus* observed to be present in 25 fecal specimen, giving a prevalence of 16.7%, making it the most encountered helminthes in the chickens, and *Heterakis gallinarum* was observed to be the parasite with the lowest prevalence, affecting 18 chickens, with a prevalence of 12.0% (Table 1).

With respect to sex, a total of 38 males were found to be infected by helminthes parasites, with the prevalence among males being 25.3%, and *Raillietina cesticillus* infecting the highest number of male chickens 17 (44.7%). A total of 25 female chickens were infected, with a prevalence of 16.7%, and *Ascaridia galli* infecting the highest number of female chickens 11 (44%). A chi-square analysis showed significant association ($P < 0.05$) between infection and sex of the chickens (Table 2).

With respect to age groups, a total of 24 chickens aged (0 - 5) months were infected with a prevalence of 16%. *Raillietina cesticillus* had the highest infection rate 12 (50%). In the age group (6 - 10) months, a total of 21 chickens

were infected giving a prevalence rate of 14%. *Ascaridia galli* recorded the highest infection rate 9 (49.9%). Among age group 11 months and above, the total number infected were 18 giving a prevalence rate of 12%. *Heterakis gallinarum* recorded the highest infection rate 8 (44.4%) (Table 3).

With respect to breeds, a total of 28 old layer chickens were found to be infected by helminthes parasites, with prevalence being 18.7%, *Raillietina cesticillus* had the highest infection rate 13 (46.4%). The broiler had a total infection rate of 22 which gives a prevalence of 14.7%, *Raillietina cesticillus* had the highest infection rate 9 (40.9%). Among the Native chickens, the total number of infections were 13, with a prevalence rate of 8.7%. *Ascaridia galli* recorded the highest infection rate 8 (61.5%). A chi-square analysis showed significant association between infection and breeds of the chickens ($P < 0.05$) (Table 4).

4. DISCUSSION

In this study, 150 chicken fecal specimens were examined, 63 specimen were found to be infected with intestinal helminth parasites, giving a prevalence of 42%. This finding is in line with what was reported in other parts of Nigeria, such as Sokoto 42.5% [1], Nsukka 35.5% [Nnadi and George, 2010]. From the results however, it was observed that the parasite that affected the highest number of chickens was *Raillietina cesticillus,* with a prevalence rate of 16.7%, followed by *Ascaridia galli* (13.3%), and then *Heterakis gallinarum,* with the lowest prevalence of 12.0%. The prevalence of intestinal helminthes of the chickens in Eke Awka market (42%) was observed to be lower than the 90.2% prevalence recorded by [23] in Abuja, the 81.5% recorded by [24] in Kaduna and the 87% recorded by [25] in Bauchi. The average prevalence of 42% observed is believed to be associated with the chickens being put in cages and so they do not have to roam about in order to feed. The chickens used in this study were raised under intensive management with some degree of supplementary feeding. Two nematode species, *Ascaridia galli* and *Heterakis gallinarum,* and one cestode specie, *Raillietina cesticillus,* were encountered in this study, following worm identification. Junaidu *et al* (2014) identified *Raillietina tetragona* as the most prevalent gastrointestinal helminthes of local chickens in their work. Nnadi and George (2010) identified a prevalence of 16.13% for *Raillietina* spp. while [2] did not identify any cestode in their studies on parasites of local chickens in Nsukka and Umuahia areas of South eastern Nigeria respectively. Our study identified *Raillietina cesticillus* as the most prevalent helminthes parasite, with a prevalence of 16.7%, followed by *Ascaridia galli*, with a prevalence of 13.3% and *Heterakis gallinarum* being the least, with a prevalence of 12%. This finding disagrees with some reports by [26,23] as they identified *Ascaridia galli* to be the most prevalent helminthes specie. Infection rates in nematodes rest on many factors such as soil type, locality, pattern of rainfall and the feed given to the chickens which differ from place to place. The disparities in these factors may elucidate the differences observed between the prevalence of nematode infections by various investigators. Several of the species have been reported as possibly pathogenic for poultry with clinical manifestations such as ulcerations, nodule formation and varying degrees of enteritis leading to anorexia, diarrhea, depression, emaciation and mortality if untreated [20]. Furthermore, the discovery of *Heterakis gallinarum* in this work is much more important because of its association with *Histomonas meleagridis*, the causative agent of blackhead of chickens, particularly in domesticated turkeys [20]; as such, these chickens could act as reservoirs of the disease.

Our work showed that male chicken had more gastrointestinal helminthes than the females in some breeds with an overall prevalence of 25.3%. This may be due to their active feeding habit which most likely exposes them to helminthes infection. It could also be due to chance as the female chicken recorded higher rates of some infections within some breeds than the males.

Our study revealed that there was significant difference ($p < 0.05$) among the age groups, with greater prevalence seen among (0 – 5) months chickens (16%) consequently indicating that age is a factor in the infection of the chickens. This may be ascribed to the poor resistance of younger chicken as they have had little exposure to the parasites and therefore will have lower immunity compared to the longer exposure of the older chickens to helminthes infections from their environment and hence they have better immunity and are more resistant.

Ascaridia galli had the highest prevalence rate in native breeds (61.5%). This is in line with previous studies from several areas of Nigeria; Nsukka (Enugu State) [26], Zaria (Kaduna State)

Table 1. The overall prevalence of intestinal helminthes of chickens

Parasites	Number of chickens examined	Number of chickens infected	Prevalence (%)
Ascaridia galli	50	20	13.3%
Heterakis gallinarum	50	18	12.0%
Raillietina cesticillus	50	25	16.7%
Total	150	63	42%

(P < 0.05)

Table 2. The prevalence of intestinal helminthes of chicken with respect to sex

Sex	Number examined	*Ascaridia galli*	*Heterakis gallinarum*	*Raillietina cesticillus*	Total
Male	75	9(23.6%)	12(31.6%)	17(44.7%)	38(25.3%)
Female	75	11(44%)	6(24%)	8(32%)	25(16.7%)
Total	150	20(31.8%)	18(28.6%)	25(39.7%)	63(42%)

(P < 0.05)

Table 3. The prevalence of intestinal helminthes of chicken with respect to age groups

Age Groups (Months)	Number of chickens examined	*Ascaridia galli*	*Heterakis gallinarum*	*Raillietina cesticillus*	Total
0-5 months	50	6(25%)	6(25%)	12(50%)	24(16%)
6-10 months	50	9(42.9%)	4(19.1)	8(38.1)	21(14%)
11 months and above	50	5(27.8%)	8(44.4%)	5(27.8)	18(12%)
Total	150	20(31.8%)	18(28.6%)	25(39.7%)	63(42%)

(P < 0.05)

Table 4. The prevalence of intestinal helminthes of chicken with respect to breeds

Chicken Breeds	Number Examined	*Ascaridia galli*	*Heterakis gallinarum*	*Raillietina cesticillus*	Total
Old layer	50	7(25%)	8(32%)	13(46.4%)	28(18.7%)
Broiler	50	5(22.7%)	8(36.4%)	9(40.9%)	22(14.7%)
Native Chickens	50	8(61.5%)	2(15.4%)	3(23.1%)	13(8.7%)
Total	150	20(31.8%)	18(28.6%)	25(39.7%)	63(42%)

(P < 0.05)

[27] and Jos (Plateau State) [28]. In other parts of Africa, some reports have indicated that *Ascaridia galli* is usually the most vital helminthes of chicken [29,30]. Our work is also in line with previous studies [31-33] which believed that local breeds are more subjected to infections because of their wandering and feeding behaviors that expose them to more contact with intermediate hosts thereby predisposing them to infections.

5. CONCLUSION

The overall prevalence of intestinal helminthes was 42%, the helminthes parasites found were *Ascaridia galli, Heterakis gallinarum* and *Raillietina cesticillus. Raillietina cesticillus* was observed to have the highest prevalence 16.7%. Government and poultry owners should ensure that good caging and management systems are adopted to prevent the spread of intestinal helminthes among chickens so as to ensure maximum output from poultry production.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Jegede OC, Asadu IA, Opara M, Obeta SS, Olayemi DO. Gastrointestinal parasitism in local and exotic breeds of chickens reared in Gwagwalada Guinea Savannah Zone of Nigeria. Sokoto J Vet Sci. 2015;13(3):25-30.

2. Ngongeh LA, Chiejina SN, Lawal AI. Prevalence of gastrointestinal helminth infections in slaughtered chickens reared in the Nsukka area of Enugu state, Nigeria. IOSR J Agric Vet Sci. 2014;7(11):51-54.
3. Uhuo AC, Okafor FC, Odikamnoro OO, Onwe CS, Abarike MC, Elom JN. Common gastrointestinal parasites of local chicken (*Gallus domesticus*) slaughtered in some selected eatery centers in Abakaliki, Ebonyi State: Implication for meat quality. Int J Dev Sustain. 2013;2(2):1416 -1422.
4. Baboolal V, Suratsingh V, Gyan L, Brown G, Offiah NV, Adesiyun AA et al. The prevalence of intestinal helminthes in broiler chickens in Trinidad. Vet Arhiv. 2012;82(6):591-597.
5. Afolabi OJ, Simon-Oke IA, Olasunkanmi AO. Intestinal parasites of domestic chicken (*Gallus gallus domesticus)* in Akure, Nigeria. J Biomed. 2016;1(4):1- 4.
6. Oniye SJ, Audu PA, Adebote DA, Kwaghe BB, Ajanusi OJ, Nfor MB. Survey of helminth parasites of laughing Dove, *Streptopelia segalensis* in Zaria –Nigeria. African Journal of Natural Sciences. 2000;4:65-66.
7. Frantovo D. Some parasitic nematodes (Nematoda) of birds (Aves) in The Czech Republic. Acta Societatis Zoologicae Bohemicae. 2002;66(1):13-28.
8. Bruinsma J. World agriculture: Towards 2015/2030: An FAO Study, Routledge; 2017.
9. Sebho HK. Exotic chicken status, production performance and constraints in Ethiopia: A review. Asian Journal of Poultry Science. 2016;10(1):30–39.
10. National Bureau of Statistics. Annual Abstract of Statistics. 2016; Federal Republic of Nigeria, Nigeria.
11. Ola-Fadunsin SD. Investigations on the occurrence and associated risk factors of avian coccidiosis in Osun state, Southwestern Nigeria. J Parasitol Res. 2017;(8):6.
12. Youssef AI, Uga S. Review of parasitic zoonoses in Egypt. Tropical Medicine and Health; 2013.
13. Agbolade OA, Arosoye E. Akajiugo et al. Gastrointestinal parasites of domestic fowls from Ijebu North, Southwestern Nigeria. Basic Research Journal of Agricultural Sciences. 2014;3(7):60–64.
14. Ashenafi H, Eshetu Y. Study on gastrointestinal helminthes of local chickens in Central Ethiopia. Journal of Veterinary Medicine. 2004;155(10):504 - 507.
15. Ogbaje CI, Agbo EO, Ajanusi OJ. Prevalence of *Ascaridia galli, Heterakis gallinarum* and tapeworm infections in birds slaughtered in Makurdi Township. International Journal of Poultry Science. 2012;11(2):103 –107.
16. Satish S, Priti M. Gastro intestinal helminthes parasites of local chickens specimen from tribal areas of Madhya Pradesh. International Journal of Life Science. 2013;1(4):284–287.
17. Kumar S, Garg R, Ram H, Maurya PS, Banerjee PS. Gastrointestinal parasitic infections in chickens of upper gangetic plains of India with special reference to poultry Coccidiosis. Journal of Parasitic Diseases. 2013;39(1):22– 26.
18. Magwisha H, Kassuku A, Kyvsgaard N, Permin A. A comparison of the prevalence burden of helminth infections in growers and adult free range chickens. Tropical Animal Health Production. 2002;34(3):205 -214.
19. Eshetu Y, Mulualem E, Ibrahim H, Berhanu A, Aberra K. Study of gastro-intestinal helminthes of scavenging chickens in four rural districts of Amhara region, Ethiopia. Revision Science Techniques Office International Epizootic. 2001;20(3):791-796.
20. Soulsby EJL. Helminthes, arthropods and protozoa of domestic animals. 7th ed. bailliere tindall publishers, London. 1982;787-792.
21. Cheesbrough M. District laboratory practice in tropical countries. Cambridge University Press. United Kingdom. 2009;196 - 198.
22. Taylor MA, Coop RL, Wall RL. Veterinary parasitology. 3rd ed. blackwell publishing Ltd, Oxford. 2007;809.
23. Matur BM, Dawam NN, Malann YD. Gastrointestinal helminth parasites of local and exotic chickens slaughtered in Gwagwalada, Abuja (FCT), Nigeria. N Y Sci J. 2010;3(5):96-99.
24. Junaidu H, Luka S, Mijinyawa A. Prevalence of gastrointestinal helminth parasites of the domestic fowl (*Gallus Domesticus*) slaughtered in Giwa Market, Giwa local government, area, Kaduna state,Nigeria. Prevalence, 19 Editions. 2014;7.
25. Yoriyo KP, Adang KL, Fabiyi JP, Adamu SU. Helminthes parasites of local chickens

in Bauchi state, Nigeria. Sci World J. 2008;3(2):35-37.
26. Nnadi PA, George SO. A Cross-sectional survey on parasites of chickens in selected villages in the sub humid zones of South-Eastern Nigeria. Journal of Parasitology Research. 2010;141824.
27. Luka SA, Ndams IS. Gastrointestinal parasites of domestic chickens, *Gallus gallus domesticus* (Linnaeaus 1758) in Samaru, Zaria, Nigeria. Science World Journal. 2007;2(1):27-29.
28. Pam VA, Daniel LN, Brengshak S, Wai MS, Omalu CJ, Ashi RD. The survey of intestinal parasites of local and exotic chickens slaughtered at Yankari market, Jos, Plateau State. Journal of Medical and Pharmaceutical Science. 2006;2(3):27-30.
29. Eshetu Y, Mulualem E, Ibrahim H, Berhanu A, Aberra K. Study of gastro-intestinal helminthes of scavenging chickens in four rural districts of Amhara region, Ethiopia. Revision Science Techniques Office International Epizootic. 2001;20(3):791-796.
30. Kaingu F, Kibor A, Shivairo R, Kutima H, Okeno T, Wayhenya R, Kahi AK. Prevalence of gastrointestinal helminthes and coccidian in indigenous chicken from different agro-climatic zones in Kenya. African Journal Agricultural Research. 2010;5(6):458-462.
31. Agbolade OA, Arosoye E, Akajiugo et al. Gastrointestinal parasites of domestic fowls from Ijebu North, Southwestern Nigeria. Basic Research Journal of Agricultural Sciences. 2014;3(7):60–64.
32. Ohaeri C, Okwum C. Helminthic parasites of domestic fowls in Ikwuano, Abia State Nigeria. Journal of Natural Sciences Research. 2013;1.
33. Mwale M, Masika PJ. Point prevalence study of gastrointestinal parasites in village chickens of Central district, South Africa. African Journal of Agricultural Research. 2013;6(9):2033–2038.

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