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Original article

Gastrointestinal Parasites of Chicken Slaughtered at Ariara Junction Market, Osisioma Ngwa L.G.A., Abia State, Nigeria.

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ABSTRACT

Gastrointestinal parasites of chicken cause significant harm and financial losses on the poultry sector as they can induce weight loss, reduce egg production and feed conversion ratio, causing malnourishment and mortality. This study aimed to identify the gastrointestinal parasites of chicken slaughtered in Ariaria Junction Market, Abia State. A total of 150 chicken intestines were collected from poultry butchers, after obtaining their consent, into a labelled container indicating the breed and sex of the chickens. The samples were transported to the laboratory for visual and microscopic examinations. The samples were processed using floatation technique and all gastrointestinal parasites were identified directly under the microscope. The result showed that 126(84%) chicken samples were infected with the eggs and adults of gastrointestinal nematodes only from three (3) genera. The nematodes present were *Ascaridia galli* 86(68.3%), *Heterakis gallinarum* 15(11.9%), *Subulura brumpti* 25(19.8%); with *A. galli* being the most prevalent. The small intestine, large intestine and the caecum of the chicken were particularly infected. Mixed infections (*A. galli* and *S. brumpti*) were seen in female broilers and old layers (*H. gallinarum* and *A. galli*); as male broilers had only single infection with egg of *A. galli.* The parasites showed some degree of preference for female chickens as the difference in the infection rate was significant between the sexes ($P<0.05$), although the type of breed had no impact on the rate of the infestation ($P>0.05$). Veterinary extension officers should educate farmers about gastrointestinal parasites, focusing on local farmers' management practices to protect poultry health and promote public health.

Keywords: Chicken, gastrointestinal infestation, helminthes, nematode, prevalence

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INTRODUCTION

The poultry population in Nigeria is made up of 84% local/indigenous breeds and 16% exotic breeds [1]. The most commonly-kept poultry are the domestic chicken (*Gallus gallus domesticus*). Chickens contribute 70% of meat and eggs and 20% of protein intake in developing countries [2]. In addition to providing meat and eggs, chickens have economic value to resource-limited households, cultural and aesthetic values in some Nigerian communities [3]. One of the main obstacles to chicken production is disease. Important poultry production parasites such as nematodes, cestodes, and trematodes inflict significant harm and financial losses on the poultry sector as they induce weight loss, reduce egg production, reduce feed conversion ratio, cause malnourishment and mortality in young birds [4]. These parasites are present in the intestine or faeces, particularly when discharged as fresh specimen; and are found more frequently in the warm seasons, when the intermediate hosts are abundant. Parasitic infestations in chickens are usually conjoint. Many researchers have reported high prevalence of multiple infections in their survey [5]. Concurrent infestations by multiple parasites, particularly those with a preference for the gastrointestinal tract, increase the risk of early chick death and other production losses in adulthood [6].

Typically, chickens are maintained in free-range environments, where they forage for food in their surroundings and consume locally obtainable resources. The scavenging activity exposes the local chickens to potentially infectious parasite eggs, larvae, and intermediate hosts of parasites which might lead to infections [7]. Global research indicates a high prevalence of gastrointestinal helminthes infection in chickens reared in rural scavenging system. Loss of fowls can be attributed to poor / no housing, poor management and little or no veterinary care. The occurrence of parasitic infection has significantly decreased in the commercial production system, primarily as a result enhanced housing, hygiene and management practices [5]. Descriptive information on the prevalence of diseases, immunizations, and treatments, if available, could enable the development of policies to prevent and control diseases as well as improvements to veterinary services. Presently, there is a scarcity of information on the gastrointestinal parasites of chickens in the area. The study, therefore, focused on contributing baseline data on the prevalence and species of gastrointestinal parasites affecting chicken in Abia State.

MATERIAL AND METHODS

Sample collection

A total of one hundred and fifty (150) chicken intestines were collected from poultry butchers at Ariaria junction market, Abia State in a labelled container with the sex and the breed of chickens indicated. Prior to sample collection, the butchers were engaged on the aim of the study and consent was obtained. Samples were randomly collected, 5 samples each per week, from male broilers, female broilers and old layers (a total of 15 samples per week) for 10 weeks between November 2022 to January 2023. Samples from 50 female broilers, 50 male broilers and 50 old-layers were collected, preserved in 10% formalin and transported to Biology laboratory of Federal University Otuoke, Bayelsa State, Nigeria, for analysis.

Parasitological Analysis

The faecal matters from the intestines of the chicken were processed using

floatation technique [8]. A 1g of each sample was mixed with little quantity of super-saturated saline solution in a test tube. Afterwards, the mixture was filled to the brim with the super-saturated saline solution, a clean glass slide was placed on top of the test tube, and the mixture was left for 20-30 minutes. The slide was carefully removed and a cover slip was placed on it. Each slide was examined under the light microscope and identification of the observed eggs/cysts was done based on their characteristic morphology. Counting of the observed parasites' species was done. Meanwhile, the alimentary canal of each chicken was opened down to the rectum and all worms visible to the naked eye were collected using a pair of forceps [9].

Identification of Parasites

The eggs, cysts and adult stages of the parasites seen were identified by adopting the identification keys [8] and [10].

Data analysis

The data gathered from the study were collated in Excel sheet and the frequencies of occurrence of parasites were calculated in percentage. The data were then exported to SPSS version 21.0 for Chi-square test using 0.05 as the significant level.

RESULTS

Overall and sex- related prevalence of gastrointestinal parasites infection of the chickens examined.

Out of 150 chicken samples examined, 126(84%) were infected with the eggs and adults of gastrointestinal nematodes from three (3) genera. The nematode species present includes *Ascaridia galli*, *Heterakis gallinarum* and *Subulura brumpti*. The Small intestine, large intestine and the caecum of the chicken were particularly infected (Table 1).

Mixed infections were seen in female broilers (*A. galli* and *S. brumpti*) and old layers (*H. gallinarum* and *A. galli*); as male broilers had only single infection with egg of *A. galli.* Both breeds of chickens were infected with *Ascaridia* nematode (Table 1).

Female broilers (30%) had the highest prevalence of infection with gastrointestinal parasites; while the male broilers showed the least prevalence of infection (25.3%). The parasites showed some degree of preference for female chickens as higher infection rates were observed in female broilers (30%) and Old layers (28.7%). Statistically, the difference in the prevalence of infection with gastrointestinal parasites between the sexes was significant ($P<0.05$) (Table 1).

Table 1: Overall prevalence of gastrointestinal parasites infection in the chickens slaughtered at Ariara Junction Market.

Chicken breed examined	Number examined	Infected chicken (%)	Identified parasites	Parasite's site of preference
Male broiler	50	38(25.3)	Eggs of *Ascaridia galli*	Small and Large intestine
Female broiler	50	45(30)	Adults of *Ascaridia galli, Subulura brumpti*	Small and Large intestine, Small intestine
Old layer	50	43(28.7)	Eggs of *H. gallinarum,* Adults of *Ascaridia galli*	Caecum, Small and Large intestine
Total	150	126 (84%)		

Prevalence of individual parasites species detected in the Chickens slaughtered at Ariara Junction Market.

The prevalence of the individual parasite species detected in the study include *A. galli* 86 (68.3%), *H. gallinarum* 15 (11.9%) and *S. brumpti* 25 (19.8%), with *A. galli* being the most prevalent (68.3%).

Two different stages of development of the nematode parasites detected in the study were the eggs and adults. Adult stage of *Ascaridia* occurred most 48(38.1%), followed by the egg stage of the *Ascaridia* 38(30.2); while the least prevalent stage of parasite seen was the egg of *H. gallinarum* 15(11.9%). The difference in the prevalence of individual parasites in the chicken examined was not significant ($P > 0.05$) (Table 2).

Table 2: Prevalence of individual parasites species in the Chickens slaughtered at Ariara Junction Market.

Parasites species	No. Infected (n = 150)	% Prevalence
Eggs of *A. galli*	38	30.2
Adults of *A. galli*	48	38.1
S. brumpti	25	19.8
Eggs of *H. gallinarum*	15	11.9
Total	**126**	**84.0**

Association between chicken breeds and the prevalence of gastrointestinal parasites infection

The prevalence of infection in female broilers (30%) was higher than that of old layers (28.7%) and male broilers (25.3%). There was no significant difference in the rate of infection between breeds, showing that the infection in the chickens is independent of breed ($P > 0.05$) (Table 3).

Table 3: Association between chicken breeds and the prevalence of gastrointestinal parasites infection.

Breed	No. examined	No. (%) Infected	df	X^2	*P*-value
Female Broiler	50	45 (30)	2	3.87	0.14
Male Broiler	50	38(25.3)			
Old layer	50	43(28.7)			
Total	150	126 (84)			

Discussion

The study recorded high overall prevalence (84%) of gastrointestinal parasites infection in the chickens examined. This result is lower than 92.6% and 90.1% prevalence reported by [11] and [12] respectively. However, it is relatively comparable with 81.5% prevalence from a study in Kaduna State by [13]; but higher than previous reports of 69%, 63.6%, 55%, 37.6% and 35.5% by [14-17] and [6] respectively. This discrepancy could be related to the differences in the sample sizes, diagnostic procedures, management systems, control practices in the farms, environmental conditions and seasonal differences. It has been reported that some of these factors exacerbate the infection of domestic birds in the tropics [18].

Gastrointestinal helminth parasites constitute the most significant group of parasites both in species diversity and amount of damage done to chickens in Nigeria [19,5]. Nematodes are the most common and most important helminth

species in poultry. More than 50 species have been described in poultry. Of these, the majority causes pathological damage to the host [20]. Parasites can make the flock less resistant to disease and exacerbate existing disease condition. Although mild infection is often undetectable, a number of worms can cause impaired growth and development by interfering with feed absorption. In cases of severe infection, there may be obstruction of the digestive tract resulting to death [14]. The tropical climatic condition is suitable or favorable for the propagation and development of the infective stage of helminthes infection [21]. Adequate moisture and temperature of the environment in the tropics are indeed the most determinant factors for the development of the infective stage of helminthes parasite and that may influence the epidemiology of parasite infection [22].

In this study, only nematode parasites were recorded, as no single cestode and trematode parasites were encountered. Three nematodes species were recorded which is different from five and seven nematodes recorded by some authors [23] and [16] respectively. Junaidu *et al.* [13] recorded no single trematode parasite in their study and Shifaw *et al*. [24] in his review stated that cestodes were detected less often. This, possibly, could be based on the fact that opportunity of transmission to the chickens does not present itself, since they require intermediate hosts in their life cycles [25], and trematodes eggs hatch only in water [26,27].

Ascaridia galli and *Heterakis gallinarum* were among the most commonly reported nematodes species with *A. galli* being the most common helminthes in all production systems [28]. This assertion is true as *A. galli* had the highest prevalence rate in both broiler and old layer breed in this study. Similar reports have been documented from other parts of Nigeria [23,29). This parasite was also reported as one of the most encountered nematode species by some authors [15-16,30]. In other climes, especially Africa, several studies have strongly suggested that *A. galli* is the commonest and most important helminths of poultry [31]. Similarly, comparatively high prevalence rate of *Ascaridia sp.* over *Heterakis sp.* has been reported from broilers chicken in Pakistan [32]. Contrary to all this overwhelming reports of *A. galli* being the most abundant, Junaidu *et al*. [13] reported *H. gallinarum* as the most abundant nematode parasite. *A. galli* significantly affects the health of chickens by sharing the feed consumed by the host; thus causing stunted growth and reduced egg and meat production [33]. *A. galli* can spread directly to birds through their eggs, which are highly resistant to environmental changes. Depending on factors such as temperature, humidity and pH, the eggs can remain infective for years. In situations where appropriate management practices are lacking, farm workers may bring the parasites' eggs from other sources into the farm, contaminating the birds' feed and water sources. *Subulura brumpti*, the second most prevalent parasite, can cause significant patholological lesions in chickens, significantly affecting their overall health and productivity [34]. Although, this study recorded relatively lower prevalence of *H. gallinarum* when compared to *A. galli*, its pathology and its role as a carrier of an important pathogen namely, *Histomonas meleagridis* in turkeys and chickens should be highly regarded [33].

Mixed infections, as seen in this study, have been reported by [35] in scavenging chickens and [36] in different avian species.

This is, however, in contrast with the findings of [37] and [16] elsewhere in which mixed infection was less common. Co-infections between *A. galli* with *H. gallinarum* occur more often, which is not unexpected considering the similarity in the life cycle and environmental requirements of both parasites [28].

Simon and Emeritus [38] reported that *A. galli* occurs in the jejunum and *H. gallinarum* in the caecum; whereas [39] stated that *A. galli, H. gallinarum and S. brumpti* prefer small and large intestines, caecum and small intestine respectively. This is similar to this study finding on the site preferences by the parasites.

The parasites showed some degree of preference for female chickens as higher infection rates were observed in both breeds. There was a statistically significant difference ($p<0.05$) in the infection rate between sexes. This is in agreement with [14] report of a significance difference among the infected male and the female chickens, with the female chickens being significantly more infected 19(82.61%) than male chickens 50(64.94%). Inuwa *et al.* [30], however, reported more parasites in male than in female chicken. The higher prevalence in female chickens may be attributed to their ravenous eating habits; particularly during egg production than the males which remain mostly selective [12].

This study revealed that the breed of chicken does not impact on the rate of infection with gastrointestinal parasites. This may be due to the fact the parasites have adapted to infecting different chicken breeds equally, since they are host-specific and depend on the chickens for their survival and reproduction. In another sense, since the chickens were obtained from the same area, they may share similar breeding characteristics such as housing system and hygiene which have been identified to impact of the prevalence of parasitic infestation [5].

CONCLUSION

This study had shown that the prevalence of gastrointestinal parasite infestation is high in chicken with *A. galli* reported as the most prevalent of the parasites. The parasites showed some degree of preference for female chickens. However, there was no relationship between breed of the chicken and the rate of the gastrointestinal parasites infestation. Increased efforts should be made by veterinary extension officers to educate farmers about the several types of gastrointestinal parasites of chickens and the dangers they pose. Particular attention should be paid to the management practices of local farmers in the area and provide the necessary assistance in protecting the health of poultry while also promoting public health.

Declarations:

Ethical Approval: Not applicable

Conflict of interests:

The authors declare there are no conflicting interests.

Authors' contributions:

ECO designed the study protocol. Both ECO and NEI performed the sampling and laboratory analyses, analyzed and interpreted the data. ECO managed the literature search and wrote the initial manuscript. All authors read and approved the final manuscript.

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