PREVALENCE OF GASTROINTESTINAL PARASITES OF POULTRY CHICKEN SLAUGHTERED AND SOLD IN UYO METROPOLIS, AKWA IBOM STATE, NIGERIA

ABSTRACT

Gastrointestinal parasites are importance biological enemies causing poor health in poultry, thereby causing significant reduction in harvest. This study was aimed to assess the prevalence of gastrointestinal parasite of poultry chickens slaughtered in Uyo, Akwa Ibom State. 150intestinal content of poultry chickens slaughtered were collected from poultry dressing units in market within Uyo metropolis and kept in polythene bags, and then transported to the Animal and Environmental Biology laboratory of the University of Uyo for analysis. The gizzard, small and large intestine and caeca were assessed for GIP. The method employed in this assessment was Direct Wet Mount following other standard methods. Observation of the parasites was by microscopic examination of smears mad, thereafter identification of parasite. Five species were encountered in this study: *Ascaris galli* (32.76%) had the highest, and in the order of *Eimeria tenella*(25.86%) >*Raillietinatetragona*(16.39%) >*Histomonasmeleagridisis* (16.39%). The least was recorded in *Heterakisgallinarum*(10.34%). Among the 67 (male) and 83 (female) samples, 34.38% and 65.62% respectively recorded positive. *Ascaris galli,* being the most prevalent was seen in 38 samples and *Histomonasmeleagridis*is (the lowest) was seen in only 12 samples. > 12 weeks age group recorded lowest prevalence (9.3%) while 8-12 weeks had highest (19.30%). This study reveals that 39.12% had single parasitic infection, while mixed had 60.94%. Based on these results, poultry in Uyo farms are affected with gastrointestinal parasitic infection. Therefore, it is recommended that farmer should improve upon their management skills and issues concerning hygiene.

Keywords: Prevalence, Gastrointestinal Parasites, Poultry chicken, Uyo metropolis.

1.1 INTRODUCTION

Poultry is widely distributed within and without Africa. Among members of the poultry family, chicken is the most common and accounts for approximately 98% of the total poultry population in Africa (Solomon and Udoh, 2017). The domestic fowls (*Gallus gallusdomesticus)* are the most numerous than any kind of poultry. They are kept for income generation particularly in the rural areas (Hassouni and Belghyti, 2000). Poultry includes all domestic birds kept for the purpose of human food production (meat and eggs) (Attree*et al.*, 2021). They play a vital role through their contribution to the socio-economic and cultural lives of small-holder farmers (Nyoni and Masika 2012). The greatest impediment to poultry production in Nigeria is diseases (Lawal *et al.*, 2001). Parasites can be a significant factor limiting the productivity of chickens by affecting the growth rate of chickens and causes organ damage and eventually death (Negbenebor and Ali, 2018). The domestic fowls are raised traditionally under free-range management system in villages with little or no supplementary feeding and without any veterinary care, thereby exposing them to parasitic infections (Gary and Richard, 2012). The common internal parasitic infections occur in poultry include cestodes, nematodes and coccidian that may cause considerable damage and great economic loss to the poultry industry due to

malnutrition, decreased feed conversion ratio, weight loss, lowered egg production and death in young birds (Attree *et al*, 2021). Gastrointestinal (GI) parasites are most prevalent and devastating parasites affecting the productivity of poultry birds. They are a concern for the poultry industry worldwide as they can affect the health, welfare and production performance (Shifaw*et al.*, 2021). Chickens pick up eggs of parasite by ingesting contaminated feed, water, litter and intermediate hosts such as snails, earth worms, or other insects (Makalo *et al.*, 2022). These parasitic infections hascause considerable damage and great economic loss to the agriculture industry, ranging from aquaculture (Okon *et al.*, 2020) to poultry industry (Silas *et al.*, 2024) due to malnutrition, decreased feed conversion ratio, weight loss, lowered egg production and death in young birds as a result of damage intestine (Balqis, 2013). Inadequate poultry management practices are responsible for the increase in incidence of parasitic infections. This resulted to 64% infection rate of 300 chickens in Uyo metropolis (Usip*et al.*, 2017).Keeping in view the importance of these parasites in chickens, this study is undertaken to assess the prevalence of gastrointestinal parasite of poultry chicken slaughtered in Cross River, Akwa Ibom State, Nigeria.

2.0. MATERIALS AND METHODS

2.1. Study Area

The study was conducted in Uyo LGA, Akwa Ibom State. Uyo is the capital of Akwa Ibom State, in the south south region of Nigeria which stands at a total area of about 140sq miles.

2.2. Sample Collection

A total of one hundred and fifty (150) gastrointestinal tracts of poultry chickens slaughtered in Uyo L.G.A (30 samples each from each locations of five) were obtained and taken to the Department of Animal and Environmental Biology laboratory unit, the University of Uyo for examination.

2.3. Sample Processing

In the laboratory, the gastrointestinal tracts were separated into different parts; the gizzard, small intestine, caeca, and large intestine. Each part was cut open using dissecting scissors and their content emptied into different beakers. The method employed in the examination of the gut contents was Direct Wet Mount. Using DWM method, about 8-10 drops of normal saline were added depending on the amount of the gut content and then mixed together using a spatula. A drop or two of the solution was taken and dropped on a slide, covered with a cover slip then examined under a light microscope with the magnification of x10 and x40.

2.4. Identification of Parasites

The adult worms, eggs, and larva were identified under the microscope with the aid of the identification keys by Ashenafi and Eshetu (2004), and Soulsby (2002).

2.5. Data Analysis

Data obtained from the prevalence study were analyzed using descriptive statistics and the results summarized as percentages. Students' T test was used to analyze the

difference between the prevalence of parasitic genus (Ascaris, Eimeria, Heterakis, Histomonas, Raillietina and others). Variation in the prevalence of gastrointestinal parasite in relation to parasite species, sex and age group were analyzed by using Chi-square statistics. Probabilities (P) was significant at $p \leq 0.05$. Mean intensity, Single and mixed occurrence was also calculated.

$$\textbf{Mean intensity} = \frac{\textbf{Total number of parasite}}{\textbf{Total number of host infection}}$$

$$\textbf{Frequency of occurrence} = \frac{\textbf{Number of occurrence}}{\textbf{Total number of occurrence}}$$

3. RESULTS

3.1. Overall prevalence of gastrointestinal parasites of chicken according to species

30 samples each were bought from the five study areas which made up 150 of our total number of samples used. 64 (42.67%) and 86 (57.33%) were found positive and negative respectively for gastrointestinal parasites of poultry chicken (Table 1). The 64 infected samples recorded at least one or mixed of the gastrointestinal parasitic species which includes *Ascaris galli* (nematode), *Eimeria tenella*(coccidian),*Heterakisgallinarum*(nematode) and *Histomonasmeleagridisis* (protozoan) and *Raillietinatetragona*(tapeworm) with 32.76%, 25.86%, 14.65%, 10.34% and 16.39% prevalence respectively and is significant different at $p<0.05$.

Table 1: Showing the overall prevalence of gastrointestinal parasites of chicken according to species

Species	Total no. of samples	No. of positive samples (%)	No. of negative samples	No. (%) of species infection
Ascaris galli	150	64 (42.67)	86 (57.33)	38 (32.76)
Eimeria tenella	150	64 (42.67)	86 (57.33)	30 (25.86)
Heterakisgallinarum	150	64 (42.67)	86 (57.33)	17 (14.65)
*Histomonasmeleagridis*is	150	64 (42.67)	86 (57.33)	12 (10.34)
Raillietinatetragona	150	64 (42.67)	86 (57.33)	19 (16.39)
Total				**116 (100)**

Significant at $p \leq 0.05$; $X^2 = 24.33$

3.2. The prevalence of gastrointestinal parasites of chicken according to sex

Among the 150 samples, 67 (44.67%) were male while 83 (55.33%) were females samples. Among the 67 male samples, 22 (34.38%) and 45 (30.00%) were recorded positive and negative respectively. 83 female samples were used for this research and 45 (52.33%) were positive while 41 (47.67%) were negative. This is revealed in table 2, were female samples had more prevalence than male samples. Hence, the overall prevalence of GIP on the poultry chicken based on sex was 34.38% and 65.62% for male and female respectively. The prevalence of GIP in poultry male to female chicken was significantly different ($p<0.05$).

Table 2: Showing the sex-based prevalence of gastrointestinal parasites of chicken.

Sex	No. of samples	No. (%) of infected samples	No. (%) of noninfected samples
Male	67 (44.67)	22 (34.38)	45 (52.33)
Female	83 (55.33)	42 (65.62)	41 (47.67)
Total	**150 (100)**	**64 (100)**	**86 (100)**

Significant at $p\leq0.05$; $X^2=34.19$

3.3. Species prevalence of gastrointestinal parasite of chicken based on sex

In table 3, out of 64 positive samples, *Ascaris galli* being the most prevalence, recorded presence in 38 samples. 18 (15.51%) and 20 (17.24%) were recorded for male and female samples respectively. *Eimeria tenella*was seen in 30 samples. 21 (18.10%) and 9 (7.76%) were recorded for male and female samples respectively. *Heterakisgallinarum*was seen in 17 samples. 10 (8.62%) and 7 (6.03%) were recorded for male and female samples respectively. *Histomonasmeleagridis*is was seen in 12 samples. 6 (5.17%) and 6 (5.17%) were recorded for male and female samples respectively. 19 samples recorded the presence of *Raillietinatetragona sp*.and7 (6.03%) and 12 (10.34%) wererecorded for male and females respectively. This result reveals that the species prevalence in both male and female samples is not significantly different ($p\leq0.05$).

Table 3: Showing the sex-based prevalence of gastrointestinal parasites species

Species	No. of positive samples	No. (%) of infected samples	Male	Female
Ascaris galli	64	38 (32.76)	18 (15.51)	20 (17.24)
Eimeria tenella	64	30 (25.86)	21 (18.10)	9 (7.76)

Heterakisgallinarum	64	17 (14.65)	10 (8.62)	7 (6.03)
*Histomonasmeleagridis*is	64	12 (10.34)	6 (5.17)	6 (5.17)
Raillietinatetragona	64	19 (16.38)	7 (6.03)	12 (10.34)
Total		**116 (100)**	**62 (53.45)**	**54 (46.55)**

Significant at $p \leq 0.05$; $X^2 = 18.56$

3.4. The prevalence of gastrointestinal parasites species of chicken based on age group

Three age groups were used for this research; less than 8 weeks, 8-12 weeks and more than 12 weeks. Age group < 8 had 35 (23.33%) with 14 (9.3%) positive samples, while 8-12 being the most prevalent of 29 (19.30%) positive results had 61 (40.67%) samples and >12 had 54 (36.00%) samples and 21 (14.00%) positive results.

Table 4: Showing the prevalence of gastrointestinal parasites species of chicken based on age group.

Age	No. of samples examined within the age group (%)	No. of positive samples (%)	*Ascaris galli* (%)	*Eimeria tenella*(%)	*Heterakisgallinarum*(%)	*Histomonas meleagridis*is (%)	*Raillietina tetragona*(%)
< 8	35 (23.33)	21 (14.00)	3 (2.00)	3 (2.00)	4 (2.67)	5 (3.33)	6 (4.00)
8-12	61 (40.67)	29 (19.30)	6 (4.00)	8 (5.33)	3 (2.00)	7 (4.67)	5 (3.33)
> 12	54 (36.00)	14 (9.3)	5 (3.33)	4 (2.67)	1 (0.67)	1 (0.67)	3 (2.00)
Total	**150 (100)**	**64 (42.67)**	**14 (9.33)**	**15 (10.00)**	**8 (5.34)**	**13 (8.67)**	**14 (9.33)**

3.5. The mean intensity of gastrointestinal parasites of poultry chicken.

The mean intensity was determined and revealed to be 1.39, 1.60, 1.94, 1.75 and 1.16 for *Ascaris galli, Eimeria tenella, Heterakisgallinarum, Histomonasmeleagridisis* and *Raillietinatetragonaspp*respectively.

Table 5: Showing the mean intensity of gastrointestinal parasites of poultry chicken.

Species	No. of positive samples	No. (%) of species infected samples	No. of parasite	Mean intensity

Ascaris galli	64	38	53	1.39
Eimeria tenella	64	30	48	1.60
Heterakisgallinarum	64	17	33	1.94
*Histomonasmeleagridis*is	64	12	21	1.75
Raillietinatetragona	64	19	22	1.16
Total		**141**	**222**	

3.6. Frequency of occurrence of single and mixed infection of poultry chicken

The frequency of occurrence of the parasites showed that 25 (39.12%) samples of the poultry chickens had single parasitic infection, while mixed infection recorded 39 (60.94%) (Table 6). The prevalence of those with two infections were significantly different (P<0.05). The sex-specific prevalence of the parasites showed that both male and female chickens had the five species parasites.

Table 6: Showing the frequency of occurrence of single and mixed infection of poultry chicken

Species	**No. of positive samples**	**Frequency of occurrence**	**Prevalence (%)**
Ascaris galli	64	9	14.10
Eimeria tenella	64	6	9.40
Heterakisgallinarum	64	7	10.93
*Histomonasmeleagridis*is	64	2	3.13
Raillietinatetragona	64	1	1.56
Total		**25**	**39.06**
Ascaris galli + Eimeria tenella	64	8	12.50
Ascaris galli + Heterakisgallinarum	64	6	9.35
*Ascaris galli + Histomonasmeleagridis*is	64	3	4.69
Ascaris galli +Raillietinatetragona	64	4	6.25
Eimeria tenella+ Heterakisgallinarum	64	4	6.25
*Eimeria tenella +Histomonasmeleagridis*is	64	1	1.55
Eimeria tenella+ Raillietinatetragona	64	8	12.50
*Heterakisgallinarum+ Histomonasmeleagridis*is	64	2	3.12

Heterakisgallinarum+ Raillietinatetragona	64	3	4.68
*Histomonasmeleagridis*is + *Raillietinatetragona*	64	0	0
Total		**39**	**60.94**
Subtotal		**64**	**100**

3.2. Discussion

The study revealed the prevalence of gastrointestinal parasites in poultry chickens sampled in five different places in Uyo, Akwa Ibom State, Nigeria. A total of 150 GI samples with different parasites were observed. The prevalence of the GIP in this research was 42.67%. The 64 infected samples recorded at least one or mixed of the gastrointestinal parasitic species which includes *Ascaris galli* (nematode), *Eimeria tenella*(coccidian),*Heterakisgallinarum*(nematode) and *Histomonasmeleagridisis* (protozoan) and *Raillietinatetragona*(tapeworm) with 32.76%, 25.86%, 14.65%, 10.34% and 16.39% prevalence respectively. In this study, *Ascaris galli* had the highest prevalence which agrees with Johnson *et al.*, (2019) who reported *Ascaridia galli* (42%) and Afia *et al.*, (2019) with 41% prevalence of *Ascaridia galli* and Offiong *et al.*, (2013),all in Akwa Ibom State.

The high rate of *Ascaridia galli* in this study could be as a result of poor sanitary conditions of the environment and lack of proper medication. It could also be due to a high rate of moisture which supports larval development and enhances transmission. Additionally, *A. galli* have a direct mode of transmission and their eggs are very resistant to the environment and can survive on the outside for a long time. The eggs are passed out in the faeces of the host and develop into the infective stage in the open, contaminating feed and water sources. New hosts become infected when they ingest the infective eggs from these sources. In the deep litter system, the eggs can probably remain infective for years depending on the temperature, humidity, pH, and ammonium concentration and so where proper managerial practices are not in place, feed and water sources of birds can easily be contaminated, as farm handlers can transport the eggs of these parasites from other sources to the farm site.

The reason for the low prevalence of *Raillietina species* could be attributed to unfavorable environmental conditions which appear to be unfavorable for the survival of *Raillietina species* eggs and the development of insects (Hymenoptera) which serves as an intermediate host.

The result of this research could be attributed to differences in chicken management practices, hygiene standards, feeding habit of the poultry owners and possibly it host immunity. Similar reports of helminthes infection found in domestic fowl in this study have been documented as described from other parts of Nigeria (Elijah *et al.,* 2022) result that reported *Ascaridia galli* (84.1%) as highest prevalence in MaIfa Atai Junctionguri. This result also disagrees with Montes-Vergara *et al.,* (2021) that reported a very low prevalence of *Ascaris galli* (18.4%). This result could strongly be

as a result of prevalence of gastrointestinal parasite infections based on regions and countries (Shifawe*t al.,* 2010). For example, prevalences between 97.6% and 99.2% were reported in Germany (Larki *et al.,* 2018), 99.3% in Italy (Wuthijaree*et al.,* 2017), 72% in Iran, 73.9% in Thailand (Wuthijaree*et al.,* 2019), and 95.8% in Zambia (Chilinda*et al.,* 2020), with environmental conditions, age of birds, and availability of intermediate hosts being the main determinants for the variability of parasite prevalence (Sahu *et al.,* 2016).

In this study, gastrointestinal parasitic infection was higher in female samples 55.33% over male samples with 44.67%. However, prevalence rate among male and female chicken is statistically not significant at $p<0.05$. This is in agreement with Elijah *et al.,* (2022) that in female samples were more prevalent with 48.6% and 34.9%, Pam *et al.,* (2015) that reported 55% and 45% prevalence for female and male respectively and Asumang*et al.,* (2019), but declines with Berhe *et al.,* (2019) result that recorded higher prevalence in male over female, Negbenebor and Ali (2018). The high prevalence in female could be by chance or may be related to their feeding habit as the females are known to be more voracious in their feeding habits especially during egg production than the males which remain largely selective (Sonaiya, 1990). Though some zoonotic parasites can be found in chickens, the ones recovered in this study were not zoonotic and therefore might not pose any risk of infection to handlers.

Age groups of GIP infection was considered in this study and revealed that age group 8-12 weeks (40.67%) had more infections than < 8 weeks (36.00%) and > 12 (23.33%) weeks. Same result in poultry was also reported by Hembram *et al.,* (2015), Sheikh *et al.* (2016), Lawal *et al.,* (2016), Bandi *et al.*, (2020) and Zaliz*et al.,*(2021).

High rate of infection in 8-12 age group birds may be due to decreased immunity as well as continuous exposure to infections from the contaminated litter. Age group of >8 weeks had lowest prevalence which could be as a result of consistency immunization and intensive care as it is known to curb cases of vulnerability of these poultry to diseases.It could also be associated withthe immature immune system in young birds leavingthem susceptible to infection even with the lower orless pathogenic strain of thesespecies (Chapman *et al.* 2005).

For mean intensity (MI) of the five GIP species, had the highest prevalence rate in *Ascaridia galli. Ascaridia galli* was more prevalent in both single and multiple type of infection. Thus, the order of frequency of occurrence in the parasitic species was *Ascaris galli* (46.89%) being the highest, *Eimeria tenella, Heterakisgallinarum, Histomonasmeleagridis*is and *Raillietinatetragona.*

Majority of the species identified in this study have been reported as potentially pathogenic for poultry, inducing ulcerations and nodule formations and varying degrees of enteritis leading to diarrhoea, anorexia, depression, emaciation and death if untreated (Soulsby 2002). Also, such parasitized poultry chicken can be sources of infections to more intensively managed poultry through contaminated equipments and animal handlers. In addition, the finding of *Ascaridia galli* in this study is particularly significant due to its association with *Eimeria tenella*and/or *Histomonasmeleagridis*is, the causal agent of blackhead of poultry especially in domesticated turkey (Soulsby

2002); as such these birds could act as reservoirs of the disease. Therefore, the results obtained from this work points alarmingly to the possible economic losses that may arise from these high levels of infection among poultry chicken.

4.1. Conclusion

In the studied area, it is essential to know the conditions of the farms and farmers to develop the best prevention program, allowing the recognition of the factors that influence the possibility of disease incidence. The result from this study indicated that there was no significant difference in prevalence between locations. All the five species of GIP were present in both genders from all the study area.

4.2. Recommendations

It is recommended that farmer's intensive systems of poultry keeping should be educated by veterinary extension officers on the various kinds of gastrointestinal parasites in association with chickens and poultry as a whole and the dangers they pose in production and consumers.

Farmer and managers of poultry farms should improve upon their management skills and issues concerning hygiene.

Further studies on different species of poultry chicken should be carried on the subject matter, covering different methods and parameters to enhance better results.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the first author, (*OLO) upon request.

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