

Prevalence of Gastrointestinal Parasites in Red-Billed Quelea (*Quelea quelea*) during Rainy Season in Gyawana Ecosystem, Adamawa State, Nigeria

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Abstract

A study on the prevalence of gastrointestinal parasites of red-billed quelea (*Quelea quelea*) was carried out in Gyawana ecosystem. The prevalence of the identified gastrointestinal parasite was also determined based on the gender of the *Quelea quelea*. The study was conducted for a period of three (3) months (June to August, 2022). A total of sixty (60) adult male and female red-billed (*Q. quelea*), thirty (30) for each sex were trapped using black nylon mist nets. Direct smear method for faecal examination was performed and stool specimens were processed following a formal-ether standing operation procedure. The gastrointestinal parasites were identified on the basis of morphological characteristics. The data obtained in this study was statistically analysed using descriptive statistics and the result were presented as percentage prevalence. The result reveals five (5) different species of gastrointestinal parasites. *Ascaris* species has the highest prevalence having 19 frequencies, followed by *Giardia* species with 9 frequencies and the least is *Entamoeba* species with 4 frequencies. The prevalence of the parasites from highest to the lowest are in this order; *Ascaris* species > *Giardia* species > *Coccidia* > *Strongyloides* species > *Entamoeba* species. There is a significant difference between the species of gastrointestinal parasite based on their prevalence at ($P < 0.05$). The prevalence of gastrointestinal parasites of *Quelea quelea* by gender is 15(50.0%) and 19(63.3%), male and female respectively. The female *Quelea quelea* has higher prevalence of gastrointestinal parasite than male with the percentage of 19(63.3%) and 15(50.0%) in female and male respectively. Based on the findings of this study, it is recommended that, consumption of red-billed quelea (*Quelea quelea*) as bush meat should be minimized and well screened for the presence of parasites to avoid transmission of these parasites to human beings.

Keywords: Prevalence, Gastrointestinal, Parasites, Red-billed Quelea, Gyawana- Ecosystem

Introduction

Red billed quelea (*Quelea quelea*) is a popular source of protein in many parts of the Africa. In Adamawa and Borno State of Nigeria, *Quelea quelea* is one of the most consumed wild birds which is commonly known as “Ndir” in “Bura”, “Kwagrade” in “Kamwe” and “jan-baki” in “Hausa” is a small afro-tropical weaver bird or black-faced dioch (GTZ, 1987; Buba *et al.*, 2013). Red-billed quelea (*Quelea quelea*) can descend on the crops in great flocks similar to locust swarms. It is believed to have invaded areas outside its former territories GIZ, (1987). Red-billed quelea inhabit tropical and subtropical regions and seasonally dry savannahs, grasslands, woodlands and croplands, at altitudes below 2000m. During the breeding season, they prefer thorny or spiny vegetation such as

Acacia savannah areas (Dogget, 1988), generally at altitudes less than 1000 m (Sinclair *et al.*, 2005).

Q. quelea being a wild bird, may host a wide variety of internal and external parasites. Haem parasites, those that inhabit the blood are some of the most significant known to cause septicaemia, neonatal bacterial diarrhoea, and marginal anaemia in birds (Vazquez *et al.*, 2010). Parasitic diseases such as those caused by helminths, arthropods, blood and gastrointestinal protozoans especially Coccidian species of *Eimeria columbae*, *E. columbarium*, *E. labbeanae*, *E. tropicalis* have been reported to infect pigeons worldwide (Sari *et al.* 2008; Vazquez *et al.* 2010). These are very pathogenic and are best treated using sulpham guanidine anticoccidials or controlled by improved hygienic standard (Msoffe *et al.*, 2010).

Most of the *Q. quelea* consumed in Gyawana ecosystem Lamurde Local Government Area of Adamawa State, Nigeria, as bush meat come from different ecological environments within and around the ecosystem. Hence, red-billed quelea (*Q. quelea*) may get infected from their feeding habits which lead them to prey on grains from the plants and those that falls on ground as their source of food and also drink on contaminated water in the ecosystem. These grains are readily found on the stalk of the plants and on wet ground during the rainy season (Dawet *et al.*, 2012). Therefore, there is need for a scientific approach to identify the gastrointestinal parasites of red-billed quelea (*Q. quelea*) and to enhance their health condition. The study is aimed at determining the prevalence of gastrointestinal parasites of red-billed quelea (*Q. quelea*) and to assess the prevalence of the gastrointestinal parasites based on the gender of the birds.

Materials and Methods

Study Area

The study was carried out in Gyawana Ecosystem of Lamurde Local Government Area in Adamawa State of Nigeria. Gyawana is located at latitude 9.35° N and longitude 11.55° E and is 35metres above sea level. Lamurde Local Government Area lies

between longitude 9.36° 03.92° N and latitude 11.47° 36.25° E at an elevation of 137 metres above sea level and has a population of 77,522 people (Adebayo *et al.*, 2012). Adamawa State is located in the North Eastern part of Nigeria, and lies between latitudes 7° and 11° N and between longitudes 11° and 14° E. It is on an altitude of 185 metres above sea level and covers a land area of about 39,741 km². The State shares boundaries with Taraba State in the south and west, Gombe State in the northwest, Borno State in the north and an international boundary with the Republic of Cameroon along its eastern border (fig. 1). The Benue River, which transects the State, rises from the highland of Cameroon and flows southwards to join the River Niger at Lokoja in Nigeria. Two seasons are obtainable in the State, the wet (rainy) and dry seasons. The month of May to October constitute the wet season, during which no place receives less than 600mm of rainfall. The month of November to April constitute the dry season, during which the dry wind (harmattan) period is experienced between the month of November and February. The month of March and April are the hottest with an average temperature of 42° C, while November, December and January are the coolest months with an average temperature of 11°C (Adebayo *et al.*, 2012).

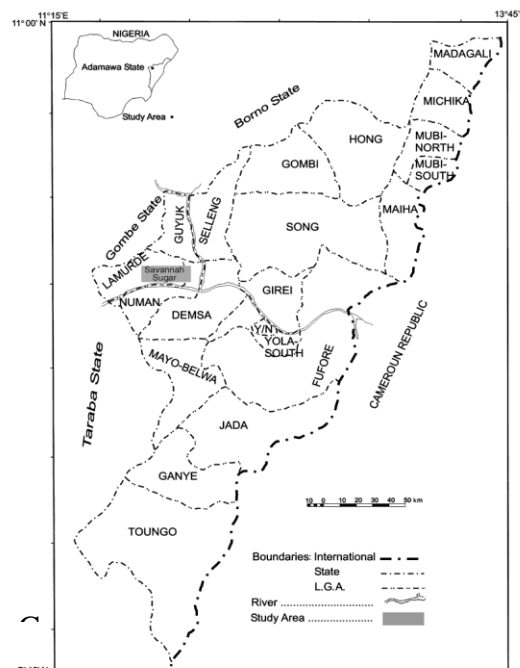


Figure 1: Map of Adamawa State, Nigeria, showing the location of the study area Savannah Sugar Company – Gyawana Lamurde LGA

Sampling techniques

The study was conducted for a period of three (3) months (June to August, 2022). Quelea birds (*Quelea quelea*), were collected fortnightly from sugar cane farms in Gyawana ecosystem, Lamurde Local Government Area of Adamawa State, Nigeria. A total of sixty (60) adult male and female quelea bird (*Q. quelea*), thirty (30) for each sex were trapped using black nylon mist nets. The bill of the female red-billed quelea (*Q. quelea*) is yellowish and slightly smaller than that of the male *Q. quelea*. The male *Q. quelea* cheeks and chin are black, while the female *Q. quelea* cheeks and chin are ash-grey. The female super ciliary stripe above the eye is bright and faintly red in colour and the eye-rim is a faded dark line, as in the line between the lower part of the bill and the ear (GTZ, 1987). Male wear a facial mask which varies in colour from black to white, and a breast and crown plumage which could also be yellow or bright red and the iris is a reddish brown (BirdLife International, 2004). The age determination of the *Q. quelea* is their eye (iris) colour (GTZ, 1987). The adult *Q. quelea* have rust-brown, while the younger birds have grey-brown colour and the juveniles have grey-black up to six-month of age. The quelea birds were captured at their water drinking points. The black nylon mist net was set between 7:00a.m and 9: 00a.m to catch the birds that went to drink water after morning feeding and 5: 00p.m to 6: 00p.m to catch those that went to drink water before going to their night roost as in Lester and Van (2014) and Buba *et al.* (2018a).

Laboratory analysis

The trapped quelea birds (*Quelea quelea*) were taken to the Laboratory of the Department of Zoology, Adamawa State University, Mubi for analysis. The samples were dissected and the intestines were collected for observation of the gastrointestinal parasites based on their sex. Using an applicator stick, the faecal specimens were collected from the intestine and transferred into a clean sample bottle for microscopic examination as described by Cheesbrough (1987) and Jajere *et al.*

(2018). Formal-ether concentration technique was also used as reported by Arcari *et al.* (2000).

Direct microscopy technique

Direct smear method for faecal examination was performed; using glass rod, placing 2gms of the faecal sample on a clean grease free slide, a drop of normal saline was added to the sample, emulsified and debris removed. Cautiously and gently the smear was covered with cover slip avoiding air bubble and over flow of the samples. The smear was mounted onto a phase contrast microscope and examined under 10x and 40x objective lens. The intestinal parasites were identified on the basis of morphological characteristics as in Arcari *et al.* (2000) and Taylor *et al.* (2001).

Formal-ether concentration method

Stool specimen was processed following a formal-ether standing operation procedure. 1g of faecal sample was transferred into a clean centrifuge tube containing 7ml of 10 percent formalin solution and mix thoroughly using vortex mixer. The suspension was filtered through one millimetre (1mm) sieve into a 15ml centrifuge tube. Then 4ml of diethyl ether was added to the formalin solution. The content was centrifuged at 3000rpm for 1 minute. The supernatant was discarded and smear was prepared using a slide from the sediment. Finally, the slide was examined under a microscope with magnification power of 10x and 40x objective lens for the presence of intestinal parasite. The gastrointestinal parasites were identified on the basis of morphological characteristics as described by Arcari *et al.* (2000).

Data Analysis

The data obtained in this study was statistically analysed using descriptive statistics using Statistical Package Software (SPSS for windows). The results were presented as percentage prevalence of the infection.

Results

Table 1: Overall prevalence of gastrointestinal parasites in red-billed quelea (*Q. quelea*) in Gyawana ecosystem

S/No.	Species of parasite	Male frequency (percentage)	Female frequency (percentage)	Total frequency
1	<i>Giardia</i> species	3 (33.3%)	6 (66.7%)	9
2	<i>Ascaris</i> species	6 (31.6%)	13 (68.4%)	19
3	<i>Strongyloides</i> species	0	5 (100.0%)	5
4	<i>Coccidia</i> species	2 (25.0%)	6 (75.0%)	8
5	<i>Entamoeba</i> species	1 (25.0%)	3 (75.0%)	4

Table 2: Prevalence of intestinal parasites in red-billed quelea (*Q. quelea*) in Gyawana Ecosystem by gender

Sex	No. examined	No. Infected	No. uninfected	% infected
Male	30	15	15	50.0%
Female	30	19	11	63.3%
Total	60	34	26	56.7%

Discussion

The findings of this study revealed five (5) different species of gastrointestinal parasite were recovered from the sixty (60) red-billed quelea (*Q. quelea*) in this period of study in Gyawana ecosystem as shown in Table 1. *Ascaris* species has the highest prevalence of gastrointestinal parasites with a total prevalence of nineteen (19), followed by *Giardia* species (9), and the least was *Entamoeba* species (4). The trend of the occurrence of gastrointestinal parasites of red-billed quelea (*Q. quelea*) in Gyawana ecosystem are in this order: *Ascaris* species > *Giardia* species > *Coccidia* species > *Strongyloides* species > *Entamoeba* species. There was a significant difference between the species of gastrointestinal parasite at ($P < 0.05$). The result of this study is in line with the result of Otegbade and Morenikeji (2014) who reported several gastrointestinal parasites which include; *Strongyloides* species, *Ascaris* species and *Coccidia* species in Mallard duck (*Anas platyrhynchos*), Whistling duck (*Dendrocygna viduata*), Ross's goose (*Anser rossii*), Africa grey parrot (*Psittacus erithacus*), Senegal parrot (*Poicephalus senegalus*), Parakeet (*Psittacula krameri*), Lizard buzzard (*Kaupifalco*), Pigeon (*Columba guinea*), Peacock (*Pavo cristatus*), Purple swamphen (*Porphyrio porphyrio*), Crown crane bird (*Balearica pavonina*), White stork (*Ciconia episcopus*), Ostrich (*Struthio camelus*), Water birds (*Anser albifrons*), Parrot (*Poicephalus senegalus*), Peafowl (*Pavo cristatus*), Black crown crane (*Balearica pavonina*) birds from March to May, 2012 in five Zoological

Gardens in South-West Nigeria; University of Ibadan (U.I), Obafemi Awolowo University (OAU), University of Ilorin (Unilorin), University of Lagos (Unilag) and Federal University of Agriculture Abeokuta (FUNAAB) Zoological Gardens.

The prevalence of gastrointestinal parasite of red-billed quelea (*Q. quelea*) in Gyawana ecosystem, also revealed that females have higher prevalence (63.3%) than males (50.0%) as shown in Table 2. The findings of this study concurred with the result of Philip *et al.* (2019), who reported that the prevalence of gastrointestinal parasites of female exotic breeds of chicken, 48.0% is higher than males 38.0%, the parasites showed some degree of preference for female birds as higher infection rate was observed in females than males in both breeds in Pankrono–Kumasi, Ghana. The findings of this study is not in agreement with the result of Buba *et al.* (2018b), who reported that male pigeon birds (*Columba livia*) has higher gastrointestinal parasite of 36.6% prevalence while female has 23.33% prevalence in Mubi North Local Government Area of Adamawa State.

The overall prevalence of gastrointestinal parasites in *Q. quelea* recorded in this study was 56.7%. This is in relation to the 59.64% reported in free range (Backyard) chicken by Yehualashet (2011) in Ethiopia and slightly below to the 63.6% reported in poultry farm by Ogbaje *et al.* (2012) in Makurdi. The recorded prevalence was however, lower than the 92% recorded in chickens in Sokoto Metropolis,

Nigeria by Mikail and Adamu (2008), and 81.5% reported in domestic fowl by Junaidu *et al.* (2014) in Giwa, Kaduna State of Nigeria. This could be related to the differences in the management system, control practice in farms, species of bird, and seasonal differences in the study area (Jegade *et al.* 2007). The finding is in line with the results of Buba *et al.* (2018b), who carried out study on prevalence of gastrointestinal parasites of domestic pigeon (*Columba livia*) in Mubi North Local Government Area of Adamawa State, Nigeria. And reported that, out of the 30 pigeons examined, 18 (60%) of them were infected with one or more parasite. This is in accordance with the works of Luka and Ndams (2007); Junaidu *et al.* (2014) in domestic chicken *Gallus-gallus domesticus* in Samaru, Zaria, Nigeria in which cestodes and nematodes were implicated as the major cause of helminth infection in domestic chickens. *Giardia* generally undergoes an indirect mode of transmission where they make use of intermediate host such as ants, grasshoppers, and beetles to perpetuate their transmission. These organisms serve as food for scavenging birds and hence transmit the infective stage of the parasites to the bird upon ingestion. The study further revealed that *Ascaris* species, *Coccidia* and *Giardia* species are the most common intestinal parasites of red-billed quelea. The difference in the number of parasites infecting the birds may be as a result of the areas which red-billed quelea visited, that is, those visiting infected areas are more likely to be infected by more parasites than those that do not.

Conclusion

Among the gastrointestinal parasites found in red-billed quelea (*Q. quelea*) in this study area, *Ascaris* species have the highest frequency (prevalence rate), followed by *Giardia* species and the least is *Entamoeba* species. Multiple infections are common in the gastrointestinal tract of red-billed quelea (*Q. quelea*) in the study area. The female red-billed quelea (*Q. quelea*), has higher prevalence rate of infection than their male counterpart.

Recommendations

Based on the findings of this study, the researchers therefore recommend that, further study should be carried out on gastrointestinal parasites of *Q. quelea* during dry season in the study area to ascertain the impact by zoonotic transmission of these parasites in

the area. Also, the red-billed quelea (*Q. quelea*) should be handled with care, well screened for possible parasites and cooked thoroughly before consumption.

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