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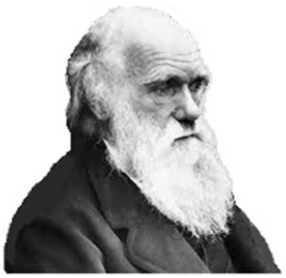

World News of Natural Sciences

An International Scientific Journal

WNOFNS 41 (2022) 98-106 EISSN 2543-5426

Ecology and Prevalence of Parasites of African Giant Rat (*Cricetomys gambianus* Waterhouse, 1840) in Benue State, Nigeria

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ABSTRACT

The study examined the body weight and parasites prevalence of African giant rat (*Cricetomys gambianus* Waterhouse, 1840) in rural setting of Gboko Local Government of Benue State. A total of 15 rats (10 males and 5 females) were collected from the wild and subjected to parasites isolation and body weight measurement at the Department of Fisheries and Aquaculture laboratory, Joseph Sarwuan Tarka University, Makurdi. Data was analyzed using descriptive statistics and student T-test. Results revealed a significantly higher (1.99kg) mean body weight in males rats compared to females (1.2 kg) ($p<0.05$). Parasite prevalence revealed 3 groups of Endo parasites (Roundworm, Flagellates and Tapeworm) and an Ecto parasite (flea) in the rats. However, there was no significant difference between the male and female rats in terms of the Endo/Ecto parasites count and load ($p> 0.05$). More so, body weight, endo and ecto parasites count and load were highly correlated with sex in the animals. For healthier consumption and domestication, adequate attention should be given towards the control of both endo and ecto parasite of captive reared African giant rat.

***Keywords*:** African giant rat, prevalence, parasites, *Cricetomys gambianus*

(Received 15 January 2022; Accepted 04 February 2022; Date of Publication 05 February 2022)

1. INTRODUCTION

The African giant rat (*Cricetomys gambianus*) belongs to the order Rodentia, family Muridae and subfamily Cricetidae [1]. It is known commonly as Gambian rat, African pouched rat, fancy rat and comic rat. In Nigeria, it is commonly called bush rat. The African giant rat is the world's largest nocturnal animal and wild rat commonly found in sub-Saharan Africa [2]. Although nocturnal, they live in different types of terrestrial habitats in burrows. The ecology of the African giant rat ranges from Senegal and the Gambian east across West Africa and the Congo basin to the Indian ocean coast of East Africa [3, 4]. It is highly fecund, omnivorous and poses a threat to native ecological communities and agricultural crops specifically the nesting species [5]. It is the commonest source of bush meat in the West African Sub region [6].

The meat of the African giant rat is rich in protein and other nutritional values compared to meat sourced from some domestic animals [6]. The rat has over time been domesticated in Nigeria [7]. The rodent helps in distribution of seeds from one place to another owing to its feeding habit [2]. Droppings from these animals also serve as a source of animal manure that contribute to increased soil fertility.

Despite its beneficial role in the ecosystem, the African giant rat serves as a carrier of a number of diseases; the rat's close associations with humans ensure a synanthropic-zoonotic association which affects human while a sylvatic-zoonotic association may occur with wild pigs and man on the other hand [8]. The African giant rat inhabits both forest, bushes and urban areas. As a result, they are prone to infection/ infestation from parasites (i.e endo and ectoparasites) from the areas they live and these parasites reduce the rodent's fitness by exploiting a number of resources responsible for their survival.

The giant rat might serve as a reservoir host of parasites of medical and veterinary importance [9, 10]. The parasites of the giant rat have been established in the Democratic Republic of Congo [11], in Southwestern Nigeria [12, 9], in Eastern Nigeria [8]. and in Zaria, were, [13]. reported hepatic capillariasis in the rats. Similarly, *Taenia serialis* cysts were recovered from the bodies of two captured African giant rats in the United States [14]. Of greater concern are human infections with *Angiostrongylus cantonensis*, the giant rat lungworm that is known to cause eosinophilic meningitis in humans [15]. Being a delicacy in Benue State, it is pertinent to study the parasites of these rodents so as to mitigate the chances of zoonotic infection transmission from them.

2. METHODOLOGY

2. 1. Study Area

The Study was carried out in Gboko Local Government Area of Benue state, Nigeria located between latitude 7°19' 30.00" N and Longitude 9°00' 18.00" E (Figure 1). Gboko lies in the guinea savannah experiencing an annual rainfall of 1000mm-1500mm with two seasons; The dry and rainy seasons. Gboko is bordered by Tarka LGA to the North, Ushongo LGA to the South, Buruku LGA to the West and Konshisha LGA to the East with a total are of 1,835 Km^2 and density of 257.49 Km^2 [16]. The area is characterized by a tropical climate with very thick forests. Surface temperature alters between 26 °C - 36 °C [17]. Its vegetation type is typically guinea savannah [18].

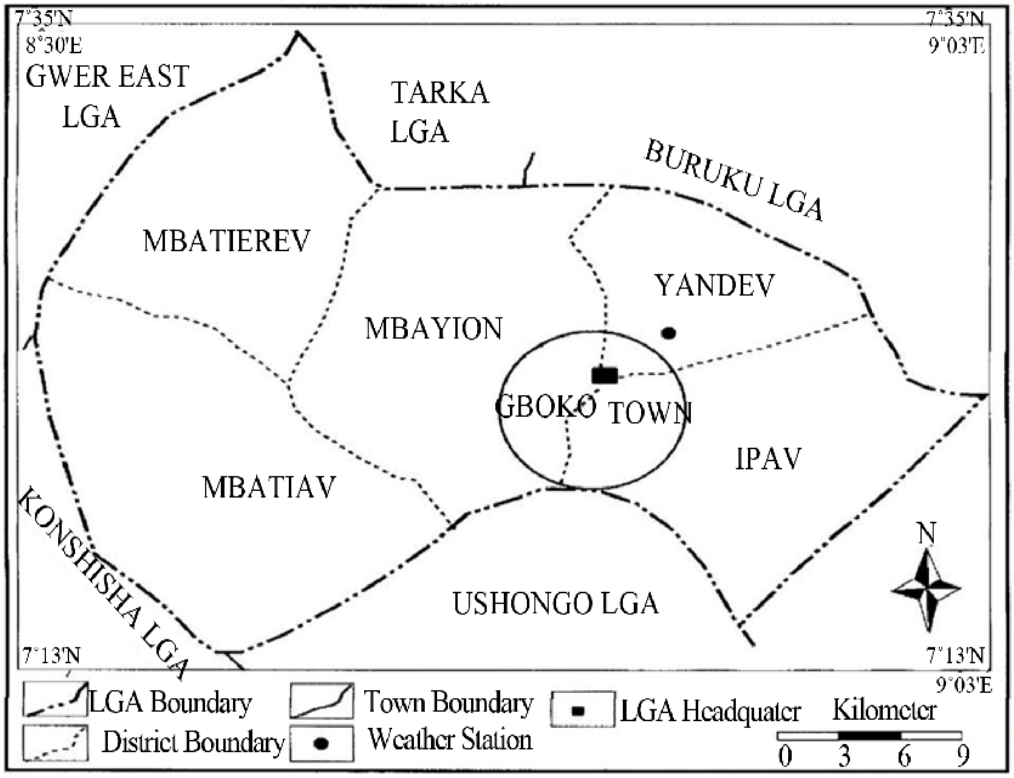


Figure 1. Map of Gboko Local Government Area
Sources: [16].

3. METHOD OF SAMPLE COLLECTION AND ANALYSES

Samples of the African giant rat (*Cricetomys gambianus*) were collected from the wild at Gboko metropolis. Habitat selection was achieved through a preliminary survey of possible sites for indicators like; rodent burrows, rodent droppings and animal tracks. The sites were labeled thus; Site A (Grass Land) Site B (Forest Area) and Site C (Cassava Farm).

Local hunters assisted in the capturing of the rats using various locally devised traps. The traps were set late in the evenings. A total of 15 rats (10 males and 5 females) were captured and taken to the Department of Fisheries laboratory, Joseph Sarwuan Tarka University, Makurdi for body weight measurement and parasites evaluation. The giant rat samples collected were sacrificed, dissected and examined for endo parasites (Plates 1-3). Helminths were recovered from the various portions of the gastrointestinal tract. The parasites recovered were processed using standard methods. The identification of the parasites was based on standard morphological characteristics. Ascoricide powder (ectoraid) was applied on the whole body of the rats to weaken the attached ecto parasites for collection using a tooth brush.

3. 1. Data Analysis

The data collected was analyzed using descriptive statistics, student T-test and correlation coefficient analysis was done to determine the variation in parasites load and count in the collected samples at $\alpha = 0.05$.

Plate 1. *Cricetomys gambianus* Waterhouse, 1840

Plate 2. Dissecting *Cricetomys gambianus*

Plate 3. A dissected *Cricetomys gambianus*

4. RESULTS

A total of 15 African giant rats were sampled, 10 were males, while 5 were females. The mean body weight (1.99 kg) of the male rat was significantly higher ($p< 0.05$) compared with the female (1.25 kg). However, there was no significant difference between the endo parasites count and load, though the male values (2.60, 7.70) were higher compared with the females (2.40 and 6.80) (Table 1). Similarly, ectoparasite count showed no significant difference, though ecto parasite load of the male rats were significantly higher than the females ($p< 0.05\%$) (Table 1).

Table 1. Body Weight and Parasites Prevalence.

No. examined	Body weight (Kg)	Endo Parasites		Ecto parasites	
		Count	Load	Count	Load
Male 10	1.9870[a]	2.60	7.70	1.50	5.90[a]
Female 5	1.2520[b]	2.40	6.80	1.40	3.60[b]
Total 15	3.239	5.00	14.5	2.90	9.50

The body weight of the giant African rat is highly correlated with their sexes ($p<0.01$). Both endo parasite load and ecto parasite count were highly correlated too ($p< 0.05$) (Table 2). Endo and ecto parasites are given in Plate 4 and 5. Three (3) groups of endo parasites were identified: roundworm, flagellates and tapeworm. While only one ecto-parasite (flea) was identified.

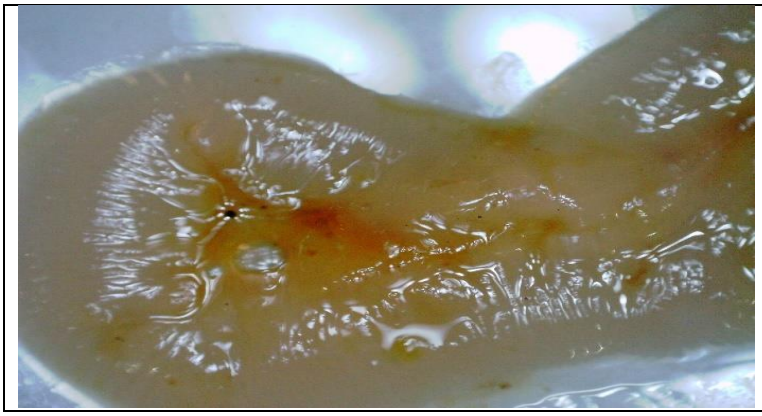
Endo and ecto-parasites associated with *Cricetomys gambianus*

A

Kingdom Animalia
Phylum Nematode
Class Secemestea
Order Ascaridida
Family Ascarididae

B

Kingdom Protozoa
Phylum Euglenozoa
Class Zoomastigophorea
Order Kinetoplastida
Family Trypanosomatidae



C

Kingdom	Animalia
Phylum	Platyhelminthes
Class	Cestoidea
Order	Cyclophyllidea
Family	Taeniidea

Plate 4. Endo parasites isolated from studied African Giant rat: (A) Roundworm, (B) Flagellate, (C) Tape worm

A

Kingdom	Animalia
Phylum	Arthropoda
Class	Insecta
Order	Siphonaptera
Family	Pulicidae

Plate 5. Ecto parasites isolated from studied African Giant rat: (A) Flea

Table 2. Correlation Matrices for Body Weight, Endo and Ecto parasites.

Parameters	**Sex**	**Body Weight (kg)**	**Endo Parasite Count**	**Endo Parasite Load**	**Ecto Parasite Count**	**Ecto Parasite Load**
Sex	1	-.854**	-.092	-.153	-.094	-.387
Body Weight (kg)	-.854**	1	.084	-.004	.002	.371
Endo Parasite Count	-.092	.084	1	.417	.557*	.231
Endo Parasite Load	-.153	-.004	.417	1	.780**	.079

Ecto Parasite Count	-.094	.002	.557*	.780**	1	-.188
Ecto Parasite Load	-.387	.371	.231	.079	-.188	1

**. Correlation is significant at the 0.01 level (2-tailed).
*. Correlation is significant at the 0.05 level (2-tailed).

5. DISCUSSION

The rat samples collected were found to harbour both endo and ecto parasites such as roundworm, tapeworm, flagellates and fleas. This is in agreement with the work by [19]. They stated that African giant rats are known to harbour various types of parasites of which some are zoonotic. These rats have adapted to living in close association with humans where they utilize agricultural products and human wastes as their food resources and buildings as their homes. The endo and ecto parasitic infections/ infestation of the African giant rat (*Cricetomys Gambianus*) is also reported in semi-arid region of northeastern, Nigeria [20]. Meanwhile, [13] had reported an incidence of hepatic capillaries in the giant rats in the guinea Savannah area of Nigeria. Similarly, parasites of the giant rat were studied extensively in Southwestern [12, 7] and in Eastern Nigeria by [8].

In relation to sex, the male rats harbored more endo parasites than the female counterparts, a result similar to that of [20] in Maiduguri. The higher intensity of infection seen in males could be suggestive of high activeness in search of food thereby making them more exposed to eggs, cysts and larvae of these parasites. Also, in terms of ecto parasites, more male rats harbored the parasites than their female counterparts. In relation to body weight, the rats with higher weights harboured more macro parasites. This is because, larger species ingest more endo parasites and have more surface area for ecto parasites attachment. Animals that eat larger volume of food have more exposure to parasites. This explains why the larger and heavier rats harboured more parasites. Rodent species are ubiquitous and may serves as bridges between many different environments and parasite populations. As a consequence, a good number of rodent species have higher parasite loads. In this study, it was observed that statistical variation ($P<0.05$) existed in the prevalence of endo, ecto parasitic infections according to sex of the animals collected.

6. CONCLUSION AND RECOMMENDATION

The results showed that the African giant rats harboured three different endo and one ecto parasites in the study area. The male African giant rat was found to be more predisposed to parasitic infection/infestation because of their activeness and their ability to search for food in various places.

Based on the findings of this study, it is therefore recommended that:

i. If the African giant rat is to be successfully domesticated, much attention should be given to the control of both the endo and ecto parasites.

ii. A combination of good management and sanitation plus proper use of biocides agents will effectively control internal and external parasites of (giant) rats so as to prevent transmission of parasites to human and animals that are of domestic importance.

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