Journal of Natural Sciences Research www.iiste.org
ISSN 2224-3186 (Paper) ISSN 2225-0921 (Online)
Vol.4, No.18, 2014

Ecological Survey of Earwigs (*Hemimerus talpoides*) as Ectoparasites of Wild African Giant Rat (*Cricetomys gambianus*) in Awka, Nigeria

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Abstract
This study was carried out for a period of two months to access earwigs as ectoparaiste of the African giant rat (*Cricetomys gambianus*) in Nnamdi Azikiwe University, Awka. Three hundred and forty eight (348) trap-night efforts were made with the aid of 8 mammal traps during the study and a total of 12 giant rats comprising of 7 males and 5 females were trapped and examined for ectoprarsites. Six of the males were infested (85.7%) and 3 of the females were also infested (60%). Giant rat are parasitized by many ectoparasites like lice and mites but during the study one particular species of earwig (*Hemimerus talpoides*) was observed and was found mainly on the abdomen and dorsal region. The infestation of the giant rat in the different sites shows no statistical difference ($P > 0.05$) with reference to the sex of the giant rat and also the location.
Keywords: *Cricetomys gambianus*, Earwig, ectoparasites, *Hemimerus talpoides.*

Introduction

The African giant rat (*Cricetomys gambianus*) also known as Gambian pouched rats from the genus *Cricetomys* is the largest muriod in the world (Ryan, 1989). The species currently recognized are: *Cricetomys ansorgei, Cricetomys emini,* and *Cricetomys gambianus* (Kingdon, 1989). In Nigeria an increasing amount of interest is currently expressed on the biology of this wild rodent; This is not surprising because of the catalogue of their importance which has lead to their being domesticated as a mini-livestock to enhance the supply of animal protein among the populace (Faturoti and Ajayi, 1978). In Awka town, the giant rat is consumed as a second choice or substitute of bush meat after the wild grassutter (*Thryonomys swinderianus*). The rodent serves as a supplementary protein source for the rural dwellers in Awka where it is commonly eaten as bush meat, thus assisting in food security (Novak, 1997). The meat is also nutritionally superior to some domestic meat in terms of protein content (Mogbo *et al*., 2011). Apart from the provision of animal protein, giant rats also provide raw materials since their skin is used as hide (Okoye and Obiezue, 2008) it also generate revenue and income to the hunters who sell the rats in exchange for money (Asibeg, 1974). The African giant rat has been used in Tanzania successfully, to detect land mines (Nowak, 1999) as their acute sense of smell is very effective in detecting explosives and they are light enough not to detonate any of the land mines. The giant rat according to Weetjens *et al* (2009) can diagnose tuberculosis in sputum due to its high acuity of odour perception. The rats also serve as exotic pets and are proposed as laboratory model for investigation into many physiologic and pathologic conditions (Olayemi and Adeshina, 2002). The rodent helps in dispersal of seeds from one place to another from different plants when they eat the fruits produced (Cooper, 2008). The droppings of giant rats are a source of animal manure which can contribute to increased fertility of soil (Nowak, 1999). They also break up soil larger particles into smaller particles leading to improved soil structure. The burrows made by them leads to aeration of the soil and consequently improved soil fertility.

Despite the importance and economic values of giant rats, they are adversely threatened by a lot of human factors because they are considered rather tasty and are hunted and even raised in farms for their meat, this has lead to a significant drop in their population (Vos, 1978) Agricultural practices like bush burning and clearing of forest and bushes for building of houses and other structures also affect the population of this rodent. Predators like carnivores, snakes and wild cats that feed on the rodents as food also reduce their population. According to Okoye and Obiezue (2008) the giant rats which are in great demand as food by the natives are usually infested by some ectoparasites; this could be attributed to the fact that the giant rat spend their entire life in the forest, bushes and thickets except when they are trapped and domesticated, so are liable to come in contact with whichever ectoparasite that appears to be prevalent in the area they live. These parasites reduce the rodent's fitness by exploiting the host for resources necessary for their survival. In many cases, it is difficult to demonstrate that the rodent is harmed. According to Macdonald and Harrison (2005) the parasites affect the health of the giant rat by constant itching and irritation. The ectoparasites which lives on the skin or attaches to the hair follicle cause mortality due to anaemia from their blood sucking activities and inconveniences associated with skin irritation (Dipeolu, 1976) when feeding becomes irregular the rodent becomes emaciated and becomes susceptible to various other sickness. Mogbo *et al* (2012) in his survey of ground dwelling small

mammals in Awka, observed that earwig was the most abundant ectoparasite of giant rat in Awka, therefore, the study focuses on the ectoparasite of the wild giant African rat with the aim to produce a database of pattern of infestation which no researcher has done in Awka.

Materials and methods

The study was carried out in three sites in Nnamdi Azikiwe University, Awka, Nigeria located between Latitude 6^0N and Longitude 7^0E. Awka lies in the Guinea Savanna experiencing an annual rainfall of 1000mm – 1500mm with two seasons – the dry and rainy seasons. Site selection was achieved through a preliminary survey of possible sites for indicators like: rodent burrows, rodent droppings, devoured vegetation and cassava and animal tracks. The sites were labeled thus: Site A (Grassland area), site B (Forest area) and Site C (Cassava farm).

The study lasted for two months during which three hundred and fourty eight (348) trap-night efforts were made with the aid of eight live mammal traps set in the study sites. The traps were set late in the evenings, baited with fried "akara" balls (bean cake) and inspected very early in the morning to prevent the trapped animal from dying of starvation and adverse heat from the sun. The earwigs were removed from the body of the rodents with forceps, killed in chloroform and preserved in 70% alcohol. The sex of the giant rat was recorded. The sight of infestation and number of earwigs per infested giant rat were also recorded. The collected data were subjected to ANOVA and two sample T-test to test for significant differences.

Result

A total of 12 giant rats were captured throughout the study period and 9 were infested with *Hemimerus talpoides*. The number of earwigs per infested giant rat ranged from 4-9. (Table 3). The prevalence of earwig on the giant rats was higher in males (85.7%) than in females (60%) and the number of male rats captured was also higher than the female rats (table 1). Table 1 also showed a high prevalence of infestation of earwigs on the total captured giant rats (75%). The earwigs had a preference for the abdominal region of the rats and a total of 38 (59.4%) earwigs were found in the abdominal region while 26 (40.6%) were found in the anal region (table 2). Table 4 reveals that the highest number of earwigs was found in Site B while none was found in site C. Analysis shows no significant difference in the infestation pattern of the earwigs on male and female giant rats as well as the comparison of infestation patterns at the sites.

Table 1: Prevalence of ectoparasite (earwing) in giant rat

Sex	No examined	No infested	Prevalence (%)
Male	7	6	**85.7**
Female	5	3	**60**
Total	**12**	**9**	**75**

Table 2: Infestation on the body regions

Region	Presence of Parasite	No of Parasite
Head	-	**-**
Abdomen	+	**38**
Anal region	+	**26**
Dorsal	**-**	**-**

Table 3: Infestation in different sites

Giant Rat	Sex	Site Found	Number
1	Male	A	**4**
2	Female	A	**7**
3	Female	A	**8**
4	Female	B	**0**
5	Male	B	**9**
6	Male	B	**7**
7	Female	B	**7**
8	Male	B	**5**
9	Male	B	**8**
10	Male	B	**9**
11	Male	C	**0**
12	Female	C	**0**
Total			**64**

Discussion

The high number of male giant rats captured with respect to females could be attributed to the fact that male giant rats have a wider home range than the females (Ajayi, 1975). Males also wander more often, sometimes to very far distances in search of food and mates (Peterson, 2006) while the females spend limited time in search of food and hurry back to their burrows to take care of their young (Ajayi *et al.*, 1978). The high infestation of earwigs on male rats with respect to females could be attributed to the fact that males spend more time outside their burrow so are liable to come in contact with whichever ectoparasites that is prevalent in that area. Exposure also predisposes them more to earwigs than females since earwigs are nocturnal and also come out at night to feed on plant matter and shed skin from giant rat (Pellitteri, 1999). There was however no significant difference in the infestation pattern with respect to sex of the giant rat so it could have occurred by chance. The high number of earwigs obtained in site B (forest) could be because the forest is still in its natural form without any form of clearing for agricultural purposes; the forest provides the earwigs a suitable habitat and cover against other organisms that feeds on them. No earwig was observed on the body of the giant rats captured in site C. This can also be due to the fact that the site C (cassava farm) is constantly cleared and weeded regularly for agricultural activities and sometimes chemicals (insecticides) are applied to the farmland which kills any form of insect that may be present in the farm. Since test for significance showed no significant difference in the infestation pattern of earwig with respect to location (table 6) it could be inferred that the location of the giant rat in the 3 sites has no effect on the number of parasites infesting them.

Conclusion

The study has shown that the sex of giant rat does not contribute to infestation pattern of earwig and also the locations in the three sites sampled do not contribute to infestation pattern of earwig. There is need for more detailed studies to determine accurately what influences the infestation of this ectoparasite (earwig) on the body of the giant African rats (*Cricetomys gambianus*), and thus access the risk they pose to animal health as well as human health in Anambra state in general due to the wide distribution of giant rat and this is equally pertinent because a lot of the local population now consumes the giant rat as a special delicacy due to their taste and low cholesterol content.

References

Ajayi, S. (1975) Field Observation on the biology, domestication and reproductive performance of the African Giant rat *(Cricetomys gambianus*) *Mammalia* 39: 343-364.

Ajayi, S., Tewe, O. and Faturoti, E. (1978) Behavioral changes in African Giant rat under domestication. *East Africa Wild life Journal* 16 (2) 137-143.

Asibeg, E.O.A (1974) Wild life as a source of protein in Africa South of Saharan. *Biological conservation* 6 (1) 32 – 39.

Cooper, R.G (2008) Care husbandary and disease of the African giant rat (*Circetomys gambianus*). *Journal of South Africa. Veterinary Association*. 79(2) 62-66.

Dipeolu, O and Ajayi, S (1976) Parasites of the African giant rats (*Cricetomys gambianus*) in Ibadan, Nigeria. *East Africa Wild life Journal*. 14(1) 85-89.

Faturoti,C., Ajayi, S.O Tewe,S. (1978) Behavioural changes in African giant rat under domestication. *East African Wild Life Journal* 16(2) 137-143.

Kingdon .J. (1989) The African giant rat (*Cricetomys gambianus*) *East African mammal* 95-45-47.

Macdonald. T.W., Harison . J.L (2005) Parasite and disease load of Giant rats in England. *Journal of parasitology* 95:785-793.

Mogbo T. C., Okeke J. J., Ebenebe C. I., Anizoba M. A. and Ufele A. N. (2011). Assessment of feeding and digestibility in the African giant rat (*Cricetomys gambianus*) under captive conditions. *African Journal of Bioscience.* Vol 4(1): 73-77.

Mogbo T. C., Ebenebe C. I., Okeke J. J. and Ezeonyejiaku D. C. (2012). Dry season survey of ground-dwelling small mammals in three habitat types in Nnamdi Azikiwe University, Awka. *African Journal of Bioscience.* Vol 5(1): 67-71.

Nowak, R. (1997) Mammals of the world retrived from: htt/wwpressjhu.edu/books/walkers mammal of the world/rodentia muridae. Retrived 26 May, 2012.

Nowak, R.M. (1999) Walker's Mammal of the world Johns Hopkins university press. London pp 204.

Okoye, I.C, and Obiezue. R.N. (2008) Survey of the gut parasite of rodents in Nssuka Ecological zone. *Animal Research International* 5(2) 846-847.

Olayemi, F.O and Adeshina, E. (2002) Plasma biochemical value in the African giant rat (*Cricetomys gambiamus*). *African Journal of Biochemidical Research* 6:33-36.

Peterson, A.T, (2006) Native range ecology and invasive potential of cricetomys in North America. *Journal of Mammalogy*. 87:262-264.

Pellitteri P. J. (1999) Controlling earwigs. Cooperative Extension Publication. Wisconsin. PP 2.
Ryan, J. (1989) Evolution of check pouches in African giant rats (*Cricetimys gambianus*) *Journal of mammalogy* 2:287-274.
VOS. A (1978) Games as food. A report on significance of giant rat in Africa and Latin America. *Unasyluar* 5:2-12.
Weet Jens (2009) African giant rats for Tuberculosis detection. A novel diagnostic technology. In Global forum update for Health. Pro Book pub. Wood bridge. PP 42.

Appendix

Table 4: T-test for sex of giant rat on infestation pattern

Sample	Size (sample)	Mean	Variance	Standard Deviation	Standard of Mean
Male	7	6.286	10.57	3.251	1.229
Female	5	4.000	14.50	3.8.8	1.703

T (students' t-test value) = 1.21 on 10 degree of freedom
The probability of mean of male giant rats being equal to the mean of female giants rats = 0.289
Which is greater than 0.05 level of significance therefore, null hypothesis is accepted and conclusion or influence drawn, that ectoparasites of the giant rats do not differ significantly with the ectoparasites found on the female giant rats irrespective of the different locations.

Table 5: ANOVA table for comparison of infestation pattern with site

Source of Variation	D.F	S.S	M.S	Feal	Probability
Site	2	63.91	31.95	2.86	0.109
Error	9	100.67	11.19		
Total	11	136.67			

Table of means for the site A, B and C
Site A = 6.33 Standard error of site means = 1.365
Site B = 6.33 LSD = 4.368
Site C = 2.34
There is no difference in the ectoparasite infestation in the different sites where the giant rats were trapped. In order words, the ectoparasites infestation of the giant rats is significantly ($P > 0.05$) similar in all the sites.

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