African Journal of Environment and Natural Science Research
ISSN: 2689-9434
Volume 7, Issue 1, 2024 (pp. 106-112)
www.abjournals.org

PARASITIC FAUNA OF *ACHATINA ACHATINA* IN OTUOKE COMMUNITY, OGBIA LOCAL GOVERNMENT AREA, BAYELSA STATE.

Chinonye Oluchi Ezenwaka[1*] and Mercy Ibilesu Obakimo[2]

[1&2]Department of Biology, Faculty of Sciences, Federal University Otuoke, Bayelsa State, Nigeria.

[*]Corresponding Author's Email: chyladyn@yahoo.com
Tel.: +2349123126745

Cite this article:

Chinonye O. E., Mercy I. O. (2024), Parasitic Fauna of Achatina Achatina in Otuoke Community, Ogbia Local Government Area, Bayelsa State. African Journal of Environment and Natural Science Research 7(1), 106-112. DOI: 10.52589/AJENSR-DX4TUO2X

Manuscript History

Received: 11 Oct 2023

Accepted: 1 Feb 2024

Published: 20 Feb 2024

ABSTRACT: *The Giant African land snail, Achatina achatina, is an invasive species recognized for being a serious agricultural pest and vector for diverse parasites that cause diseases in humans. This study assessed the prevalence of parasites harboured by the snails collected from bushes in the Otuoke community of Bayelsa State, Nigeria. The snail samples were collected and transported to the laboratory for examination using wet mouth preparation and teasing methods. Subsequently, they were classified by size into small, medium and large. The body organs were individually teased and examined under the microscope. 122 snail samples (32 small, 54 medium, 36 large) were randomly collected for this study and examined for the presence of eggs or larvae of parasites, out of which 108 (88.5%) were infected. The larvae of only two species of parasites, Angiostrongylus cantonensis (90.1%) and Strongyloides stercoralis (9.9%)) were recovered from the infected snails, with A. cantonensis being most prevalent, 737 (90.1%). The parasites were most prevalent in the medium snails (42.6%), followed by the small size (23.8%) and then, the large size snails with the least prevalence of infection. The slime, intestine and stomach were infected, with the parasites being more in the slime (88.5%) than any other body parts. Since the Giant African land snail serves as an intermediate host for several parasites, a thorough understanding of the snail parasites' lifecycles and modes of transmission to humans is important, for human health and welfare, sustainable snail farming, and for maintenance of snail biodiversity.*

KEYWORDS: Parasitic fauna, larvae, Snail, *Achatina*, Bayelsa.

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INTRODUCTION

Giant African Land Snail, *Achatina achatina* (Olushi *et al.*, 2021), is a large terrestrial gastropod native to Africa (Raut and Baker, 2002; Opisa *et al*., 2011; Caron *et al*., 2014). Being one of the biggest land snail species on the planet, it has attracted a lot of interest from both scientists and amateurs because of its enormous size and distinctive appearance. As a decomposer and a source of food for many predators, *A. achatina* is vital to many ecosystems (Ekundayo & Fagade, 2005), hibernating in the tropics' dry seasons but thrives during rainy seasons in humid, wet environments. Like other gastropods, *A. achatina* can host and spread diverse parasites (Agbogidi & Okonta, 2011; Morassutti *et al.,* 2014) such as *Angiostrongylus cantonensis* (Cowie & Robinson, 2003) due to their extensive diet (Nithiuthaiet *et al*., 2004). Parasites can cause weight loss, and behavioural changes in the snails, reducing growth in the infected snails due to reduced metabolic rate and in severe cases increased mortality (Toader-Williams & Bentea, 2010).

Snail is utilised both nutritionally and medicinally (Libora *et al*., 2010). The rise in snail consumption is attributed to health-conscious individuals avoiding red meat. Snail meat offers essential amino acids, high iron, and low fat. Other mineral compositions of *Achatina* species include zinc, magnesium, calcium, sodium, potassium, and phosphorus (Fagbuaro *et al.,* 2006). In Nigeria, wild snail species consumption prevails, causing a decline in their population due to overexploitation. *A. achatina* can be farmed commercially as the population of the wild species declines significantly. Caution is needed as consuming raw or undercooked snails elevates the risk of infection in humans (Iwanowicz *et al*., 2015).

The identification of the parasitic fauna of the giant African land snail (*A. achatina*) is becoming more and more crucial as snails' consumption increases. Despite this, parasites of *A. achatina* including its prevalence are yet to be documented for the Otuoke community in Bayelsa State. Thus, this study presents baseline data in this area and highlights the role of *A. achatina* in transmitting parasitic infections, emphasising public health concerns.

METHODOLOGY

Study Area

The study was conducted in Otuoke, Bayelsa state, situated approximately at Lat 4.491°N and Long 6.201°E. Bounded by several communities, the climate features distinct wet and dry seasons, with rain from April to October and dry conditions from November to March. The area experiences consistently high average monthly temperatures. Predominantly covered by bushes and characterised by secondary forest habitat, some terrain is submerged in water. The climate is humid, with temperatures ranging from 25°C (77°F) to 31°C (87.8°F). Otuoke's unique geographical and climatic features contribute to its diverse ecological landscape in the Ogbia Local Government Area of Bayelsa State.

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Snail Samples Collection

In the wetland bush of Otuoke, 122 *A. achatina* snails were randomly collected between May and August 2023 from various habitats, such as the underside of logs, leaves, and buttresses of large trees, with the assistance of a local snail collector. The collected snails were living, active, undamaged, and free from flesh lesions or mortality. The collection occurred at night, and the snails were stored in a ventilated container before being transported to the Biology Department Laboratory at the Federal University Otuoke for further analysis.

Microscopic Examination

The snail samples collected were grouped based on their sizes: 32 small, 54 medium and 36 large, and underwent wet mount preparation and the teasing method to prevent false negatives. After washing with tap water, snail shells were cracked, and internal organs (foot, crop, intestine, and stomach) were separated. Teasing with forceps was done, and wet mount preparations were created from each organ using a pipette on clean glass slides. Snail slime was removed from the foot, placing it directly on a glass slide with a cover slip and viewed under a light microscope. Each organ was processed separately to detect the presence of parasites accurately.

Procedure for Parasite Identification

Snail samples were microscopically examined to detect parasites, with the number of parasites in each body part recorded. Larvae of the parasites seen were identified based on tail shape, cell nuclei nature, tail nature, and head shape using an identification guide.

Statistical Analysis

Data obtained from the replicate readings were used to calculate standard error and data were subjected to analysis of variance (ANOVA) at 0.05 level of probability (Obi, 2002).

RESULTS

Prevalence of parasitic fauna of Giant African land snail (*A. achatina*) in Otuoke community

One hundred and twenty-two (122) *A. achatina* snails collected from the Otuoke community were examined for the presence of parasites in this study; out of which 108(88.5%) were infected (Table 2).

Parasite species seen in the *A. achatina* snails examined

The result of the study revealed that only the larvae of two parasite species were seen; *Angiostrongylus cantonensis* and *Strongyloides stercoralis;* with *A. cantonensis* having the highest prevalence, 737(90.1%) and *S. stercoralis* being least prevalent, 81(9.9%). No eggs or cysts of parasites were found (**Table 1)**.

Table 1: Parasite species seen in the *A. achatina* snails examined in Otuoke community, Bayelsa State.

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Parasites species	Number of larvae seen	Prevalence (%)
A. Cantonensis	**737**	**90.1%**
S. stercoralis	**81**	**9.9%**
Total	**818**	**100%**

Prevalence of parasitic fauna of *A. achatina* examined based on size

Table 2 below shows the prevalence of parasitic fauna of *A. achatina* based on the size of the snails examined. The result showed that all snail sizes were parasitized with the medium size showing the highest prevalence of infection at 42.6%, followed by the small size at 23.8% and the least infected was the large-sized at 22.1%. The difference in the prevalence of infection of the snails examined based on size was not statistically significant (P-value = 0.680, $P > 0.05$).

Table 2: Prevalence of parasitic fauna of *A. achatina* examined based on size.

Size	Number Examined	Numbers infected (%)	*P*-value
Small	**32**	**29(23.8)**	**0.680**
Medium	**54**	**52(42.6)**	
Large	**36**	**27(22.1)**	
Total	**122**	**108(88.5)**	

Occurrence of parasitic fauna in different organs of the snails examined in the study area.

Table 3 below shows the occurrence of parasitic fauna of *A. achatina* examined on different sites/organs. The snails' slime showed the highest prevalence of infection (88.5%), followed by the intestine (31.9%) and then, the stomach (21.3%). Most larvae were observed swimming freely in the slime. No parasite was detected in the crop and foot of the *Achatina* snails examined. The differences in infection of sites and organs were statistically significant (P-value = 0.002, $P < 0.05$).

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Table 3: Occurrence of parasitic fauna in different organs of the snails examined in the study area.

Predilection site	Number Examined	Numbers of snails infected	*P*-value
Slime	**122**	**108 (88.5%)**	**0.002**
Intestine	**122**	**39(31.9%)**	
Stomach	**122**	**26(21.3%)**	
Crop	**122**		
Foot	**122**		

DISCUSSION

This study recorded a very high prevalence of parasitic fauna in the *A. achatina* examined (88.5%). Snails are found mostly on dirt or soil scavenging for food or reproducing, and because of this, parasites may infect snails. The prevalence in this study is high when compared with the works of Okwa *et al.* (2022) & Karamoko *et al.* (2016) who reported 33.3% and 52% respectively. The result is also higher than the 76.4% prevalence reported by Grace *et al.* (2018). The differences in findings among the range of studies could be a result of the methods used for snail examination, the feeding habits of snails in different locations, the study period and environmental conditions. The study period coincided with the rainy periods in the study area, as such, seasonal variations were not studied. Snails thrive during rainy seasons in humid, wet environments.

The two parasites identified in this study are *A. cantonensis* and *S. stercoralis*, with *A. cantonensis* recording the highest prevalence. Olusi *et al*. (2021) discovered only *A.* cantonensis in their study. This, also, had been found in big African land snails in other countries (Iwanowicz *et al.*, 2015; Kim *et al.*, 2014). According to Morley (2010), these parasites require the terrestrial molluscs' intervention to ensure their transmission to hosts. *S. stercoralis*, being a soil parasite, usually penetrates exposed skin, particularly through the foot of the snail (Ashton *et al.*, 2007).

Medium snails were the most affected 52(42.6%) in this study. This contradicts the findings of Olusi *et al.* (2021) who found that small snails were more affected. This may be a result of the different ranges used in categorising the sizes. In addition, *A. achatina* susceptible to parasitic infection could, probably, be due to its voracious feeding habit as they live in an environment where various activities take place, some of which expose them to parasitic infections (Olusi *et al.*, 2021).

Parasites that were identified were more numerous on the slime. This may be due to the more adhesive mucoid nature of the snail slime. The study's result is similar to that of Okwa *et al*. (2022), but contrary to the findings of Olusi *et al.* (2021) who reported that infections were more in the mantle. This disparity could be due to climatic factors and parasite invasiveness

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in the Otuoke community. The parasites' presence in the slime, intestine and stomach could be due to the high vascularisation in these organs (Madsen, 2004). Therefore, it is necessary to note specificity in regions while considering the varying climatic differences that could influence parasite specificity in a host. Human infection with parasite may result from handling snails and transferring larvae in the mucus from hand to mouth, especially among children playing with snails (Perchonok & Bourland, 2002)

CONCLUSION

A. achatina, a common food source, carries parasites that pose health risks to humans due to its diverse diet and environment. Diseases like Schistosomiasis and Angiostrongyliasis can be transmitted through contact with contaminated water, ingestion of raw or undercooked snails or infected foliage. Urgent measures are required to prevent human infections from this organism, which is prevalent in our surroundings and is part of local cuisine. Public education is vital to discourage intentional ingestion of raw snails, promote proper cleaning of vegetables, and advise against using unprocessed snail slime in medicine or cosmetics due to infection risks. Additionally, individuals, especially children, should wear gloves when handling snails and wash hands thoroughly. Awareness among snail handlers and the public about potential infections and health risks is crucial.

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